Chemical Week

March 1, 1958

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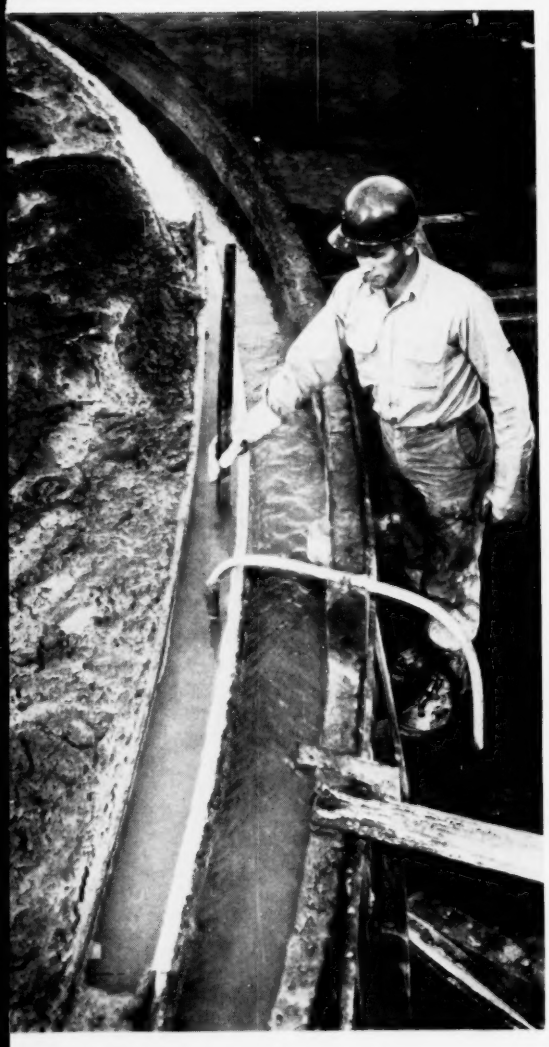

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since CHLORINE CARS never "make a beeline"...

WESTVACO® is much closer than you think

If tank cars always rolled down a straightaway, you'd get the fastest, most economical service from the nearest chlorine producer. Since they don't, it pays to take a second look at the hard realities of routing, layovers, interchanges and market-competitive rates.

From South Charleston, W. Va., Westvaco gives excellent service in the 25-state area shown on the map, give or take a reasonable distance. Frequently, we can deliver sooner than producers who are actually much closer on the map.

And with the expanded capacity of our new cell rooms we can now offer more users dependable, long-term supplies in tank cars.

To find out what we have to offer you, why not let us quote price *and delivery* on a fair share of your needs.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION
Westvaco Chlor-Alkali Division
General Sales Offices:
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How ounces of rubber harness herds of horses

Keeping the herds of horses harnessed in today's aircraft engines "on the go" often depends upon a few ounces of rubber. In the form of "O"-rings, frequently no bigger than a pencil eraser, this rubber serves as a packing on actuating cylinders, selector valves and other vital parts where positive sealing is essential.

Once, "O"-ring failures were all too frequent. Ordinary rubber could not withstand the various hydraulic fluids, the—40°F. to 160°F. temperatures, the flexing, the stretching, the elongation. But the picture changed when Goodyear introduced CHEMIGUM – first of the truly oil-resistant rubbers.

The unique composition of CHEMIGUM soon made possible "O"-rings with an absolute minimum of swell or shrinkage, excellent resistance to heat and cold, very low compression set and maximum squeeze combined with minimum friction. And its easy processing permitted meeting tolerances in the very low thousandths of an inch.

Perhaps the fate of your product also can be assured a success by CHEMIGUM. For full details, including the latest *Tech Book Bulletins*, plus the finest in technical service, just write to Goodyear, Chemical Division, Dept. O-9417. Akron 16, Ohio.

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CHEMICAL DIVISION

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIOVIC • WING-CHEMICALS

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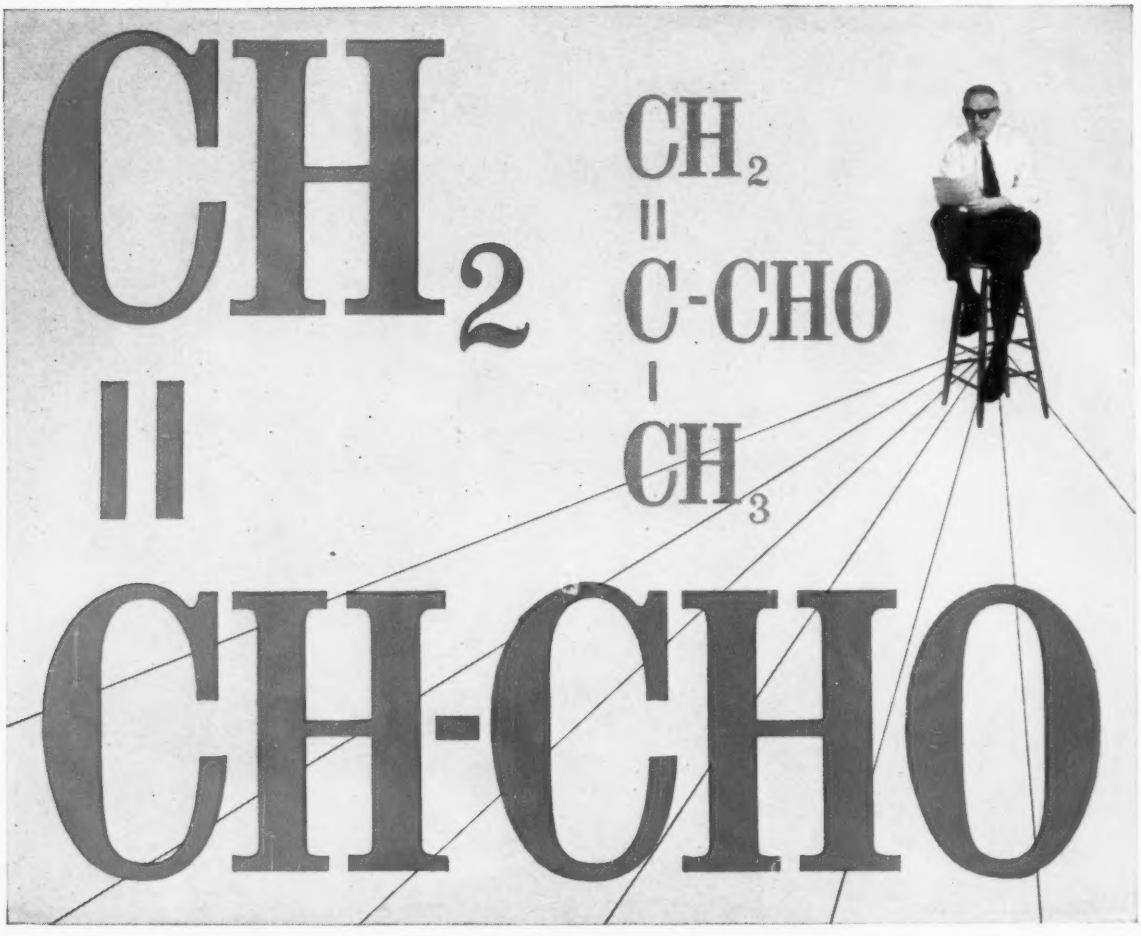


New directions for profits...

Acrolein reacts at both the double bond and carbonyl group to produce derivatives that have uses extending from textile resins to food supplements to mold inhibitors. The following references* indicate a few money-making opportunities with acrolein.

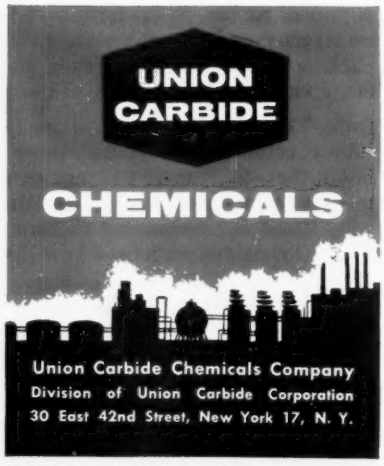
U. S. Patents 2,738,292—2,696,477.....Acrolein resins for textiles
U. S. Patents 2,504,425—2,676,190—2,584,496.....Methionine for food supplements
U. S. Patent 2,665,217.....Dichlorpropionaldehyde for controlling molds

Acrolein and the following acrolein derivatives are available now in commercial quantities:

- Acrolein Dimer (2-Formyl-3,4-Dihydro-2H-Pyran)
- Allylidene Diacetate
- 2-Ethoxy-3,4-Dihydro-2H-Pyran
- Glutaraldehyde
- 1,2,6-Hexanetriol
- 2-Hydroxyadipaldehyde
- 1,5-Pentanediol

Methacrolein, available now in drum quantities, undergoes many of the reactions of acrolein to produce methyl-substituted derivatives.

For more information on what both acrolein and methacrolein can do for you, send for our new booklet—"Acrolein and Derivatives" (F-40,118). Write Dept. N., Union Carbide Chemicals Company, 30 East 42nd Street, New York 17, New York. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.



*Nothing herein shall constitute a recommendation to practice an invention covered by any patent without permission of the patent owner.

Chemical Week

TOP OF THE WEEK

March 1, 1958

Koppers sets up two new divisions to handle plastics and chemicals sales and production ..... **p. 19**

Plastics can be substituted for human tissue in certain cases; researchers seek to broaden the applications ..... **p. 26**

Slowdown in alkylate exports? Foreign plants may hurt, but new markets promise continued export rise ..... **p. 49**

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No. 9

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OPINION

Corrolit vs. Corroless

TO THE EDITOR: An article appeared (*Oct. 5, '57, p. 66*) [describing] . . . "a protective coating that can be applied on top of rust," [called] "Corrolit."

As U.S. representatives of . . . [the maker of "Corroless"], we . . . are . . . enclosing a photostatic copy of a letter (as well as its translation) from the *Staatliche Materialprüfungsanstalt Darmstadt* (Germany), stating that no tests were made with a material called "Corrolit." . . .

N. HESS
President
Heka Imports & Exports, Inc.
New York

The Staatliche Materialprüfungsanstalt Darmstadt *says (in translation), "We inform you that an anticorrosive with the name 'Corrolit' has not been tested by this institution. . . .*

"However, the data and test results claimed for Corrolit in an article, headed 'Chemical Protection of Steel Surfaces Against Rust,' of the VDI-Nachrichten *(Newspaper of the Union of German Engineers) No. 19 of Sept. 14, 1957, page 2, are the same as in our test report made out for you on 'Waluga-Corroless.'"* . . . ED.

MEETINGS

American Society of Mechanical Engineers, International Gas Turbine Power Division conference and exhibit, Shoreham Hotel, Washington, March 3-6.

Assn. of Consulting Chemists and Chemical Engineers, symposium and banquet, Shelburne Hotel, New York, March 5.

American Management Assn., special conference on employee benefits, Drake Hotel, Chicago, March 5-7.

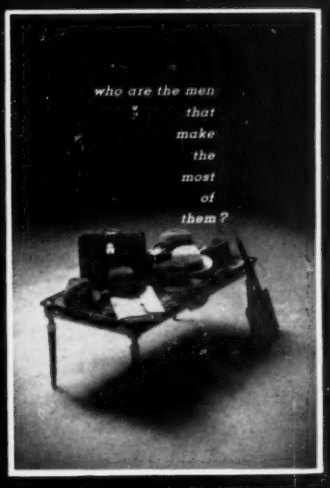
New York Board of Trade, Drug, Chemical and Allied Trades Section, 32nd annual dinner, Waldorf-Astoria Hotel, New York, March 6.

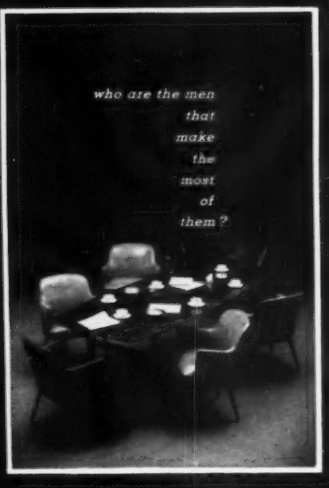
1958 Nuclear Congress, International Amphitheatre, Chicago, March 17-21.

National Assn. of Corrosion Engineers, 14th annual conference, Civic Auditorium, San Francisco, March 17-21.

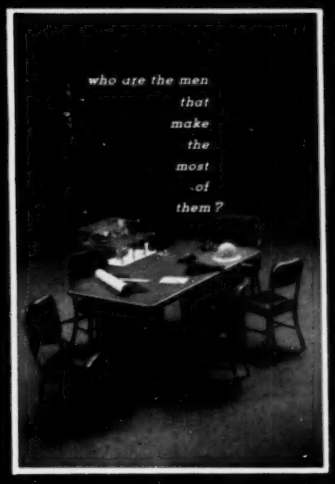
Society of the Plastics Industry, 15th annual Pacific Coast section conference, El Mirador Hotel, Palm Springs, Calif., March 26-28.

American Management Assn., discussion, private and governmental sources of financial aid for U.S. companies doing business abroad; Sheraton-Astor Hotel, New York, March 31-April 2.

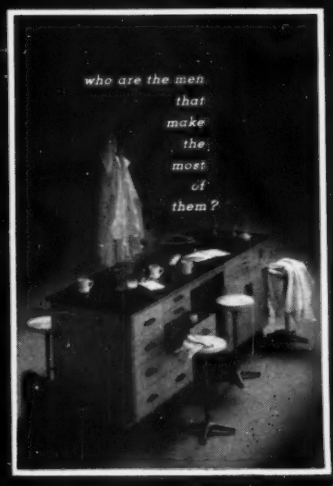




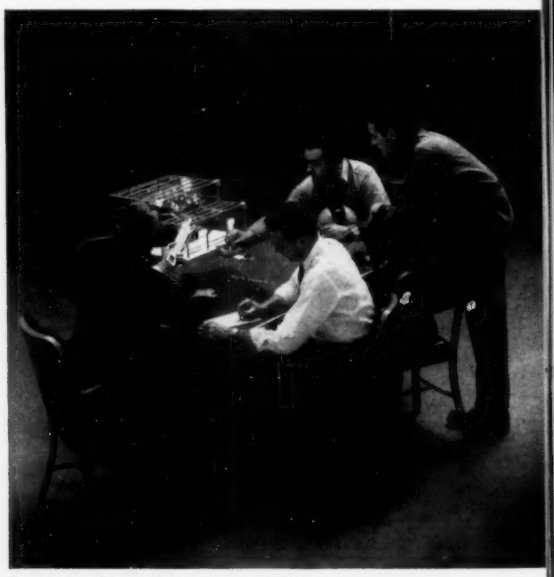
who are the men that make the most of them?



Turn the page and find out how you can make the most of them too . . .



World's widest line of POLYOLS produced by Dow



Production Experts Discuss New Facilities

you've heard of these . . .

GLYCERINE. Synthetic and U.S.P. Used in adhesives, alkyd resins, cellophane, cork products, cosmetics, dynamite, paper, drugs, rubber and tobacco.

PROPYLENE GLYCOL. Product of consistent high purity —U.S.P. grade. Widely employed in food, drug, tobacco, and cosmetic industries. Clear, colorless liquid completely miscible with water, also excellent solvent for water-insoluble organic chemicals.

DIPROPYLENE GLYCOL. Clear, colorless liquid used in resins, printing inks, plasticizers, cutting oils, textile softeners and many other products.

ETHYLENE GLYCOL. Ingredient in manufacture of permanent type antifreeze, resin plasticizer, alkyd resins and synthetic fibers.

DIETHYLENE GLYCOL. Utilized in gas dehydration, as a solvent in vapor set inks, as an intermediate in the manufacture of some resins, as a plasticizer for cork and in Udex Systems.

you've probably heard of these

POLYETHYLENE GLYCOLS. Available in 12 molecular weights from E200 to E20,000, ranging from viscous liquids through waxy and hard, tough solids. Used as plasticizers, lubricants, solvents, and as carriers in cosmetic preparations.

POLYPROPYLENE GLYCOLS. "P" series liquid through entire molecular weight range, P250 through P4,000. Employed as lubricants, solvents, plasticizers and antifoam agents. Polyglycol P2,000 (Resin Grade) has gained widespread acceptance for use in urethane foams.

AS WELL AS Tripropylene Glycol, Tetraethylene Glycol and Glycerine U.S.P. 99.5%.

have you heard of these?

HYPROSE® SP 80. Reaction product of sucrose and propylene oxide to give viscous liquid with eight hydroxyl groups. Offers interesting possibilities as surface-active agent, intermediate, plasticizer and urethane cross-linking agent.

HYPRIN® GP 25. Made by similar reaction to the one that produces Hyprose SP 80 except that it is a reaction product of glycerine and propylene oxide. Hyprin GP 25 shows promise as plasticizer and alkyd resins intermediate.

POLYGLYCOL 11 SERIES. Trihydroxy polypropylene glycols available in five viscosities, 80 through 400 centistokes at 100°F. These polyglycols look promising as nitrocellulose plasticizers and as intermediates for urethane polymers.

POLYGLYCOL 13 SERIES. Best described as non-film-forming, non-crystalline polyethylene glycols. Liquid series available in three viscosities—300, 20,000, and 50,000 cks. at 100°F. Utility as water soluble thickener in fire-resistant hydraulic fluids, also possible ingredients in hair oil formulations.

POLYGLYCOL 15 SERIES. Polyglycol 15-200 is widely

Salesmen Exchange Latest Ideas

Research Staff Screens Newest Polyols

get your polyols from the men that make the most of them

Technical Service Team Confers on Customer Problem

Here at Dow, we have a group of men devoting their entire time to the manufacture and marketing of almost every polyol you have heard of (some you might not even have heard of).

Some of these men are specialists in research and technical service. Some of them direct the actual production of the polyols. Some of them are men you know personally as the salesmen from Dow. And some of them are management men who guide the direction of future efforts.

All of them together are busy developing every possible benefit you can get from polyols. They are the men that make the most of them.

Now—How can you make the most of them, too?

1. *If you need a number of polyols in the manufacture of your product, you can enjoy the convenience of getting all of them from one source . . . all the time, any time. You can't find a broader range of polyols anywhere.*

2. *If you need only one polyol out of the entire line, you still benefit from the total experience that made the broad range possible. You get your polyols from the men that make the most of them.*

Write for "World's Widest Line of Polyols", The Dow Chemical Company, Midland, Michigan, Department GD 945A.

incorporated in brake fluid formulations. The "15" series is available in four viscosities 100, 200, 500 and 1,000 cks. Has water solubility and a wide range of organic solubility—therefore many are useful as couplers in water-organic systems.

POLYGLYCOL 166 SERIES (Polyepichlorohydrin). New polyglycol series with terminal OH groups and chloromethyl side chains. Offers dual reactivity sites. Three viscosities—450, 900, 1150 centistokes.

POLYGLYCOL 174 SERIES (polystyrene glycol). Viscous liquid in two molecular weights—500 and 750. Interesting possibilities as urethane intermediates in making coatings and resins with high dielectric constants.

POLYBUTYLENE GLYCOLS. Available in four molecular weights—500, 1000, 1500, 2000; all liquid and very hydrophobic with very high organic solubility. Possibilities as intermediates for oil additives and hydrophobic urethane foams.

DOWANOL® 122. Technically di (ethylene glycol) p, p'-isopropylidenebisphenyl ether. A white powder which can be used with dibasic acids to form alkyd resins by conventional methods.

STYRENE GLYCOL. New chemical intermediate which offers method of incorporating phenyl ring into products through two reactive OH groups. White crystalline solid with pleasant odor.

unheard of!

In addition to the hundreds of commercial and experimental polyols already prepared by Dow, many additional ones are being actively developed. These yet unborn products will expand many of the present Dow polyol lines. And expansion will be accompanied by a similar expansion of their applications as chemical intermediates, plasticizers, emulsifiers, lubricants, antifoamers, coolants, solvents, de-dusters, etc.

For news of the polyols to come, keep in touch with Dow!

*TRADEMARK OF THE DOW CHEMICAL COMPANY

YOU CAN DEPEND ON

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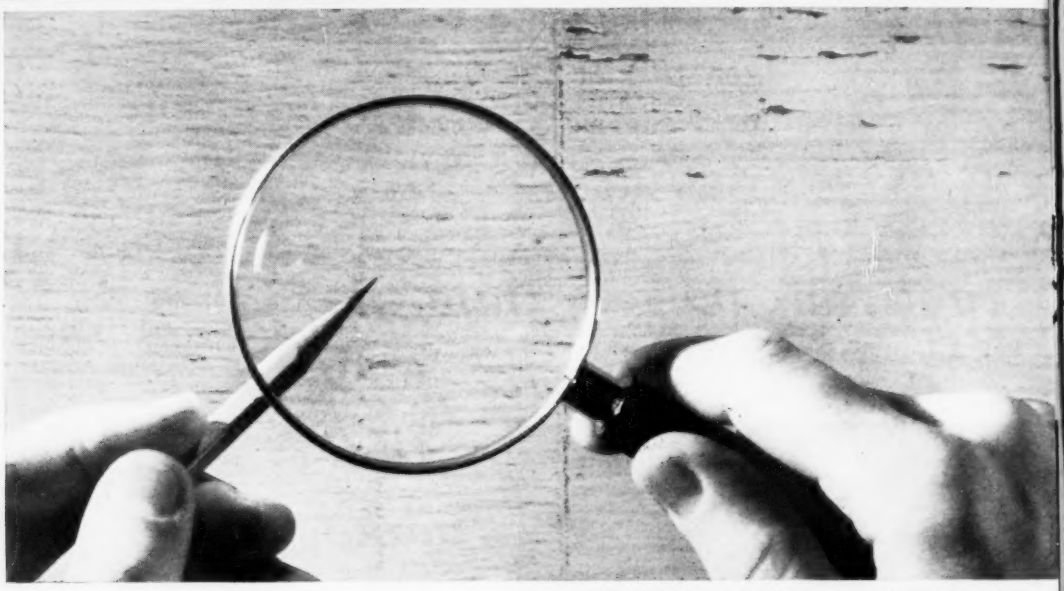
MIN CHEMISTRY *at work*

...news briefs

ON THE CREATIVE USE OF M & C PROCESS MATERIALS



*Outside House Paints get new, high-value extender pigments

Focusing six years work, ASP's—M & C Aluminum Silicate Pigments—show same solid acceptance in outside house paints they've enjoyed for years in interior coatings. *Test Fence Proved:* excellent exposure rating for general appearance, gloss, chalking, checking, cracking, dirt collection, mildew, flaking. *Documented:* 12 properties of ASP's that give a score of advantages (including lowest costs) to manufacturers and users of outside house paints. This item is "starred" on the coupon. Check it.

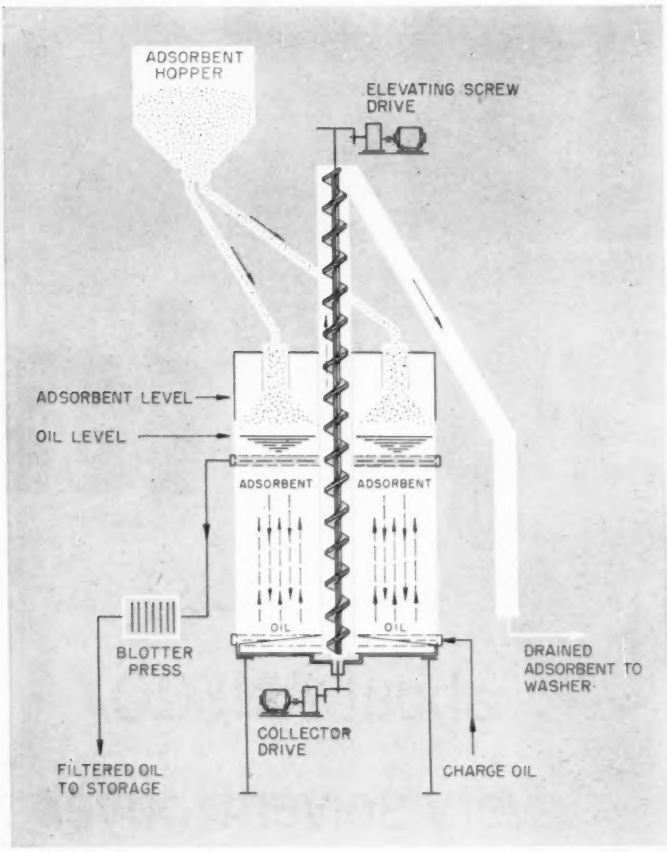
*New Laboratory Animal Bedding sets record in sanitation, low cost

One of M & C's newest products is Sterolit—a highly-sorptive, self-sanitizing, odor-killing animal bedding. In a test conducted at National Institutes of Health, in comparison to sawdust in a 3-cage-rack room, Sterolit saved $9.84 a week per room in material and labor. This item is "starred" on the coupon. Check it.

MINERALS &

CORPORATION OF AMERICA

Leaders in creative use of non-metallic minerals



USDA PHOTO

Agricultural Chemists get big assist from granular carrier

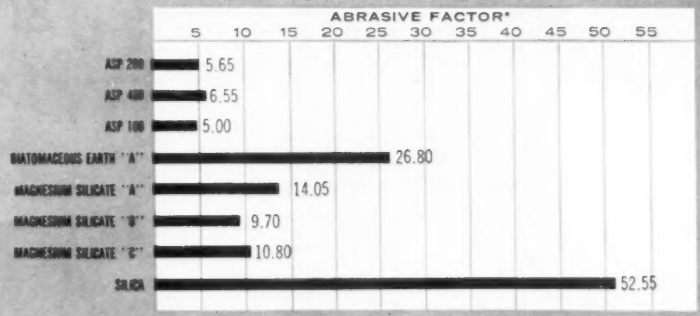
The Imported Fire Ant destroys food, forage and forest . . . attacks livestock . . . even bends mower bars with the tough crust of his mounded colony. Now in the South, he could spread rapidly. M & C—leader in the field of carriers and diluents for control poisons—teamed with toxicant people, came up with granular products to control this marauder.

Continuous Percolation . . . new tool for liquid adsorption / purification processes

Decolorization, purification, and finish-refining take a long stride away from the old batch treatments. With M & C's new patented continuous process, low capital costs, lower operating costs, and up to one-fifth greater yield of improved products per unit of adsorbent may be achieved. Low-cost, reactivatable adsorbents are used in a *continuous* system.

Ink Makers turn to ASP extenders for best grinding and printing behavior

Chart shows results of an abrasion test (details on request). As shown, low-abrasion ASP's promote high grinding speeds, low machine wear, superb "softness" and finish for the printer. ASP's offer half a dozen more pluses, too . . . one of which is low cost.



*Loss in mg in excess of 4.45 mg Machine Constant

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√ your product interest . . .
√ what you need to get tests started . . .
we'll fill your requests immediately.

For more data, see Chemical Materials Catalog Pages 358-362

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I'm interested in:
☒ Outside House Paint extender; ☐ Continuous Percolation;
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Please send, without obligation:
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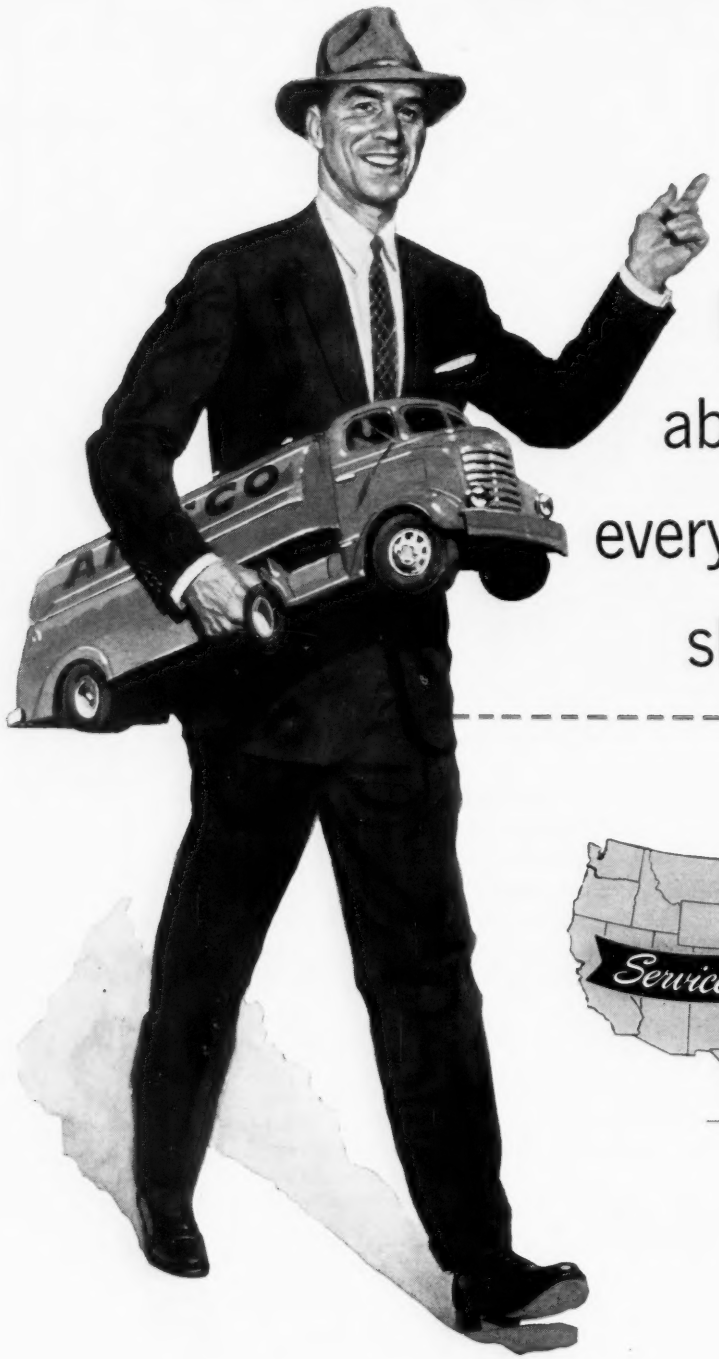
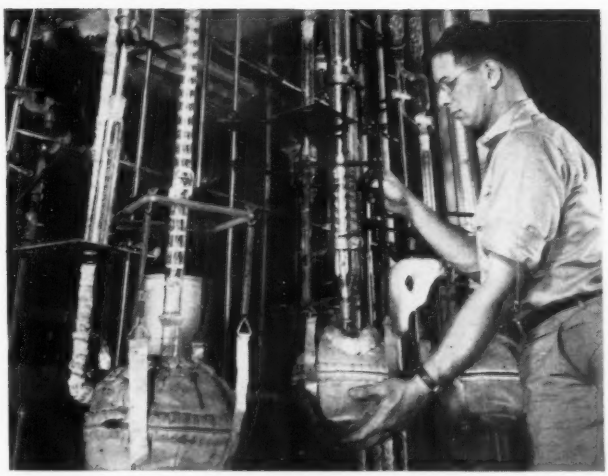


Four facts about AMSCO every solvent buyer should know

is *first* solvents



1st in sales

Year after year, American Mineral Spirits Company has enjoyed the reputation of being first in petroleum solvent sales. This is partly because AMSCO offers industry the most complete line of solvents in America. But the main reason is—solvent users everywhere know they can trust the quality of AMSCO solvents.

1st in service

Wherever your plant is located, AMSCO can deliver solvents right to your door quickly, economically. No matter how you buy—barge, tank car, tank wagon, or a drum at a time, AMSCO's nationwide network of terminals, refineries and distributor facilities gets the shipment to you *fast!*

1st in research

Chances are you are using a solvent today that was pioneered by AMSCO. In the past 35 years, AMSCO scientists have developed many new solvents, either for general industrial use, or to suit the specific need of a single industry or manufacturer.

1st in technical aid

AMSCO representatives are experienced in solvent application, always ready to help you with your solvent problems. Feel free at any time to call in one of these solvent specialists for technical aid. This is what we mean by "Service Beyond the Sale." Just call or write the AMSCO office nearest you.

AMERICAN MINERAL SPIRITS COMPANY

NEW YORK • CHICAGO • LOS ANGELES

General Eastern Offices, Murray Hill, N. J.

New H_2O_2 Shell Chemical Plant now on stream At Norco, Louisiana

With a multi-million pound capacity, this new Shell Chemical plant now takes its place as an important source of high-purity hydrogen peroxide.

Deliveries are now being made from Norco in drum to tank-car quantities.

To help you with your H_2O_2 application and handling problems, Shell Chemical maintains a very active research program and a field service to render expert technical assistance to processors. As a major consumer of hydrogen peroxide, Shell has acquired extensive experience in the special problems of H_2O_2 chemistry.

Your Shell Chemical representative will be glad to consult with you on your own H_2O_2 requirements.

Write to:

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CHEMICAL SALES DIVISION

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SHELL

Business
Newsletter

CHEMICAL WEEK
March 1, 1958

Reassurance of a sunny long-range future for chemical process companies comes this week in a new McGraw Hill study ("The American Economy—Prospects for Growth, 1957-1965-1975," McGraw-Hill Dept. of Economics, 1958). It's particularly encouraging right now, since current economic weather continues "partly cloudy."

While earnings and employment generally have been down from last year's peaks, there are numerous signs of brighter days to come. Pertinent to the over-all outlook for growth potential in the next 15-20 years are these excerpts from the new McGraw-Hill study:

- ". . . the really spectacular growth will be in light metals. Output of titanium is expected to increase several fold. And the use of aluminum may quadruple by 1975."

- ". . . needs for phosphate and potash will more than double by '75 because of the growing need for fertilizers. This will also promote fairly rapid growth in consumption of sulfur. Fluorspar is another mineral with expanding markets."

- "Total production of chemicals is expected to rise 185% by 1975. Plastics output should top 10 billion lbs. in '75, compared with 4.5 billion lbs. in '57. Synthetic fibers output may triple by '75. Drugs will be needed in even larger quantities. Most industrial chemicals will track along with the general growth in industrial production. Investment in petrochemical plants—already more than $5 billion—will nearly triple by '75, with new expenditures averaging $500 million/year. And by '75, output of petrochemicals may be up 250%."

- "By '75, it seems possible that some food items may be prepared synthetically by the chemical industry, at a lower cost than food processed from agricultural products."

•

Right now, dividends provide the industry's greatest show of strength. The all-industry total for cash dividend payments in January was down 1% from the corresponding month of '57; but makers of chemicals and allied products increased their publicly reported cash dividends from $23.6 million in Jan. '57 to $29.3 million in Jan. '58.

In earnings, the picture is highly mixed.

Despite a last-quarter dip, Du Pont's '57 net was up about 3% over that of '56. In the current quarter, according to guesses by Wall Street's Goodbody & Co., Du Pont sales and earnings will be off 8-10%, compared with the first quarter of '57. From Du Pont: no comment.

Union Carbide, however, reports January sales have increased over those in December, and President Morse Dial adds that February sales are running "about the same" as those of January.

Eastman Kodak and Merck & Co. both tell of record sales and earnings during '57.

Eastman's U.S. sales were $798.3 million, up 5% from '56; and net earnings were up 4% to $98.1 million. The company does not itemize sales figures on a product-line basis, but does report increased business on all principal chemical products.

For Merck, '57 business was bustling right through the fourth quarter. Over the entire year, sales mounted 8% to $186.9 million and net income jumped 14% to $23.1million. President John Connor notes that the company's profit margin continued to increase during the past year even though some major expense items—wages and salaries, advertising and promotion—were higher and prices of some important products were lower.

Mallinckrodt ascribes its 173% increase in net earnings—from $367,182 in '56 to $857,361 in '57—to a $2.5-million increase in net sales and the company's continuing cost control program. Net sales last year totaled $32.6 million.

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Confidence shows up strong in expansion plans.

After some hesitation (*CW Business Newsletter, Feb. 22*), Union Carbide has decided to go ahead with a $150-million expansion program in '58. That's down from last year's $190 million, but stands as the fourth-largest expansion budget in the company's history. Freeport Sulphur is staking $25 million in bank credits on its just-started Gulf of Mexico sulfur mine, about seven miles offshore from Grand Isle, La. And Noralyn Paper Mills (Shreveport, La.) is planning a multimillion-dollar newsprint plant of 250-tons/day capacity, has taken an option on a 280-acre riverfront tract south of Donaldsonville, La.

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Corporate news comes hot and heavy this week.

• Hooker Electrochemical and Foote Mineral are following through on earlier plans for a jointly owned company to make solid rocket fuel materials (*CW, Oct. 5, p. 23*). Principal products: ammonium perchlorate and other perchlorates. Name of the offspring: HEF Inc.

• Subject to approval by stockholders, Lindsay Chemical will be merged into American Potash & Chemical, and thenceforth operate as Lindsay Chemical Division of the California concern. AP&C is strong in lithium, rubidium and cesium; Lindsay's forte is rare earths and thorium compounds.

• With the approval of the U.S. Dept. of Justice, two U.S. glass companies—American Window Glass Co. (Pittsburgh) and Blue Ridge Glass Corp. (Kingsport, Tenn.)—will merge, and become what antitrust chief Victor Hansen calls an "effective integrated competitor" in the flat glass industry. The merged concern will be operated as a subsidiary of France's Saint Gobain glass and chemical establishment (*CW, Sept. 15, '56, p. 42*) and will be known as American Saint Gobain.

BRIEFS for buyers of

Caustic Potash
Sodium Sulfide and Sulfhydrate
Oxalic Acid
Benzoic Acid
Phosphoric Anhydride

Wet or dry How do you like your KOH?

If you're one of the relatively few people who prefer caustic potash in the solid state, we can provide you with any of these *seven* forms, all at 90% KOH:

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2. Flake
3. Granular
4. Walnut
5. Broken
6. Powder
7. Crushed

If one of these won't do, we can ship you 85%-strength KOH of even higher purity, in *flake* or *solid* form.

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Is all this fuss worth while over a specialty alkali like caustic potash?

Well, our customers tell us it is. And they buy, under the NIALK® label, about half the caustic potash sold in this country.

We hope you'll think so, too.

Sulfides in new drum easier to empty or re-use in your plant

Your operators will like the convenience of this new 400-lb. drum in which you can now purchase Hooker sodium sulfide and sodium sulfhydrate.

The opening is 18 inches in diameter —four inches wider and 65% larger in area than the former container.

This drum is much easier to empty with a scoop or shovel. It saves time and is safer when pouring, too. Flakes don't pile up around the opening when drum is inverted.

You'll also like the way this drum safeguards the exceptionally low iron content of our sulfide or sulfhydrate until you're ready to use it.

Only brand-new drums are shipped; none are re-used. A lacquer lining prevents iron pickup during shipping and storage. Six lugs hold the lid on tight, and let you reseal the drum to protect any unused product.

There's no increase in price for the new drum. To get its extra convenience and safety, just specify *Hooker* sodium sulfide or sodium sulfhydrate on your next order.

Oxalic acid in two crystal sizes

The distributor who keeps you supplied with Hooker chemicals can serve you even better now, if you're buying oxalic acid in l/c/l quantities.

He has, or can quickly get for you, OLDBURY® oxalic acid assaying 99.8% minimum.

It comes in two pure white crystal sizes, No. 2 fine and No. 3 fine, packed in 100-lb. and 300-lb. Leverpak containers.

When you order, specify high quality OLDBURY oxalic acid from your Hooker distributor. Meanwhile, a check on the coupon will bring you specifications, typical analysis, particle size, and other data.

Benzoic acid in new crystal form

Customers told us there were three ways to improve benzoic acid. Make it dissolve faster. Make it freer flowing. Get rid of irritating fines.

We've done all three with a new Crystal Benzoic Acid.

Both the crystals and a powdered form are available in two grades. U.S.P. grade assays 99.3% min.; technical grade is 98.0% pure. Both grades have 0.2% max. water content.

Check the coupon for more data on benzoic acid and its chemical cousin, sodium benzoate, which we also supply in U.S.P. and technical grades.

What do you want to dehydrate?

If you have a *drying* problem, don't overlook *phosphoric anhydride*, P_2O_5. This OLDBURY product is one of the strongest known desiccants.

A white fluffy powder assaying 98% min. P_2O_5, it contains no sulfate. This is an important advantage in one of its major uses—as a condensing agent in making clear methacrylate resins.

If you're interested in phosphoric anhydride for a present or a potential use, just check the coupon for more complete information.

For more information on chemicals mentioned on this page, check here:

- ☐ Caustic Potash
- ☐ Sodium Sulfide
- ☐ Sodium Sulfhydrate
- ☐ Oxalic Acid
- ☐ Benzoic Acid
- ☐ Sodium Benzoate
- ☐ Phosphoric Anhydride
- ☐ New list of products—Bulletin 100-A

Clip and mail to us with your name, title, and company address. (*When requesting samples, please use business letterhead.*)

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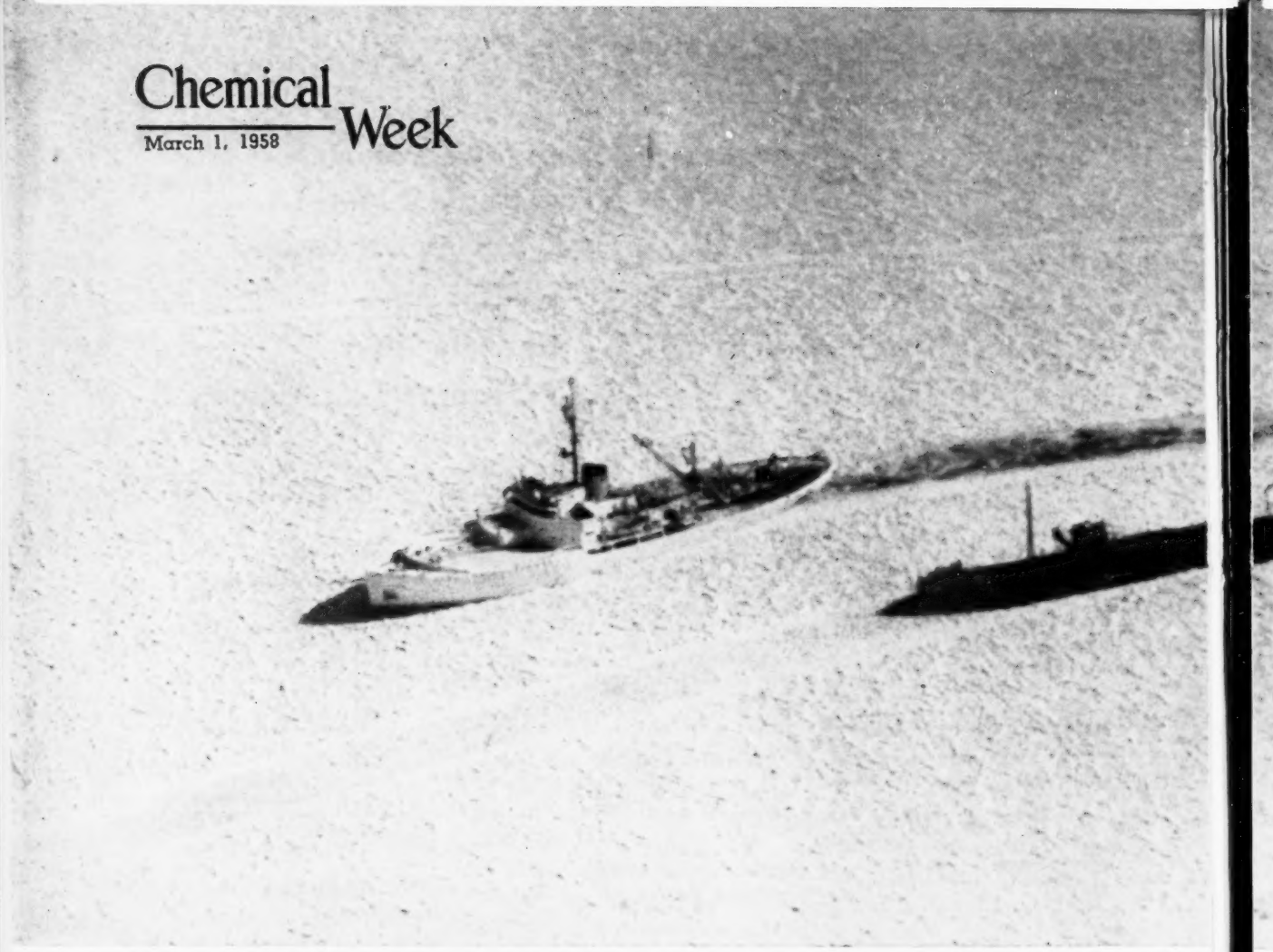
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

HOOKER CHEMICALS PLASTICS

Chemical Week
March 1, 1958



In one of many instances of icebound shipping last week, Coast Guard icebreaker carves swath in Lake

Biggest Postwar Blizzard in East Crimps

This week, industry is digging out from the worst winter storm to hit the eastern U.S. in 13 years: snowfalls up to 61 in., temperatures down to 37 below zero, winds up to 50 mph. Results: fuel shortages, equipment breakdowns, and transportation snarls in some localities—with over-all chemical production in the storm areas suffering about a 5% cutback.

Biggest question now is how river transportation will fare if the cold snap continues. The Ohio, Mississippi and their tributaries were either frozen solid or blocked with bulky ice floes. If the ice doesn't melt soon, barge men reported, they may have to start making their shipments by rail.

Du Pont reports it has two barges of methanol stranded somewhere on the Ohio River. Diamond Alkali says some of its barges are "frozen in" on the Ohio, and other companies report barges clogged or locked at wharves in "safe harbor." However, all emphasize the situation is not critical and won't be unless the freezing weather hangs on for another week.

Traffic managers are more concerned about channel depth on the Mississippi and Ohio. Since ice in tributaries reduces water flow into the stream, channel depth drops. This was a big problem last winter and could be worse this year—though it's still too early to predict whether the rivers will go down enough to hamper barge traffic and operation of locks.

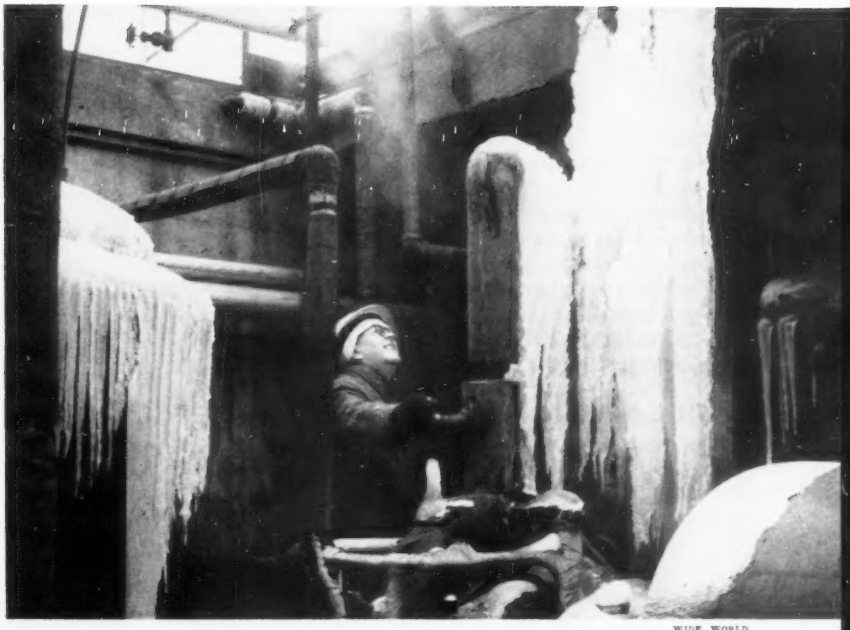
More immediate effects of the big freeze were fuel shortages, pipe freeze-ups and the failure of equipment.

Several plants in central Alabama were closed a week ago Tuesday at the request of Alabama Gas Co. to conserve gas. Some plants in the northern part of the state were shut down most of the week. However, all have now reopened and are running close to normal.

Reports from Richmond, Va., indicate that some chemical plants relying on natural gas for production processes face the possibility of having the gas shut off temporarily—unless they are on a noninterruptible customer basis. Reason: a tremendous increase in volume of gas being consumed by residential customers. Up to now, a shutoff is only a threat, hasn't materialized. But Richmond, with a normal

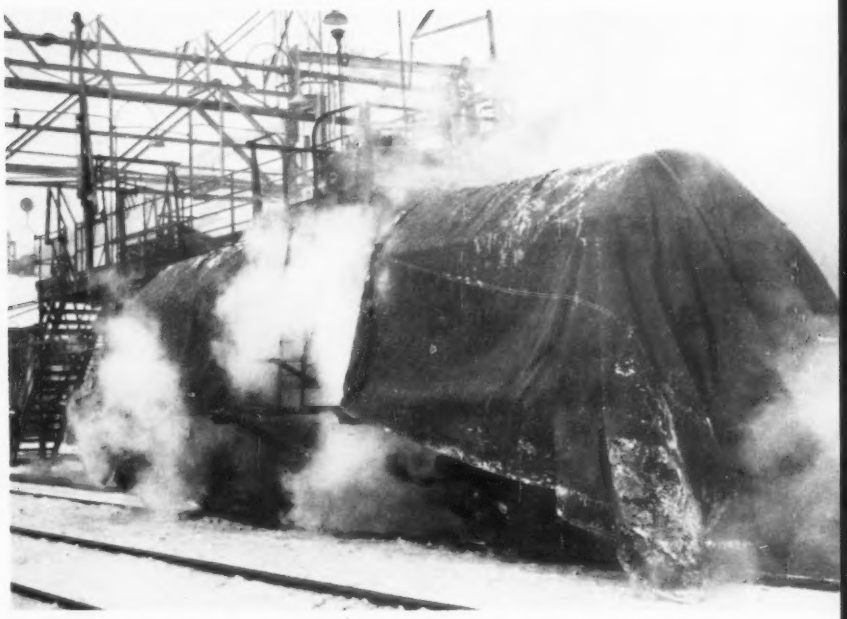
WIDE WORLD

Michigan to rescue stranded tanker.



WIDE WORLD

Icy stalactites jam water valve at Du Pont's Belle Works.



Overcoat for sulfuric tank car: canvas holds in steam from pipes.

Barges fight drifting ice floes on wind-swept Ohio River.

WIDE WORLD

Barge Shipping

demand of 26 million cu. ft./day, has been injecting butane and propane into its mains and is "peak shaving" an additional 5 million cu. ft./day from Commonwealth Natural Gas Co. to meet record demands.

And in northern Ohio, sub-zero temperatures touched off a mild industrial gas shortage. Curtailment—in order to supply home furnaces—caused temporary shutdowns on some heavy metal-working operations. But Harshaw, Diamond Alkali and Goodrich Chemical, all with large plants in the area, reported no serious cutbacks.

In fact, production slowdowns were only moderate in most of the storm area. The average drop was from 5 to 10%—less in some sections. One ex-

ception was normally sunny Alabama, which was hit by 7-in. snowfalls and near-zero temperatures. Production there was off as much as 20% during the early part of the week.

Where the big snowstorms hit, in northern New York, operations went on about as usual. Reports one Buffalo plant manager: "We're used to it up here."

And in the Northwest, where chilling winters are common, J. T. Roy, manager of American Smelting and Refining Co.'s East Helena, Mont., plant, says the winter has been "mild" and has resulted in "easier operation this year." (Helena reported a balmy 33 F last Monday, the day that Richmond, Va., suffered in a shivering 4 F.)

But despite the icy Eastern weather, all companies report—without exception—that absenteeism was far less than expected. Apparently all employees, executives and production workers made a maximum effort to get to work. Few plants reported more than 10% absentees.

The fact that the brunt of the storm came over the weekend, giving snow plows a chance to open main roads, was a big factor in the good turnout. But some executives hinted also that recession talk has caused employees to be more conscientious.

Other inconveniences brought on by the storm included freezing pipes, sticky valves, boiler failures and some slowdown in truck deliveries because of icy roads and heavy snows.

At Westvaco, near Charleston, W. Va., a 1,500-ft., 6-in. water pipe was frozen solid, took two days to unfreeze. And other plants reported boilers took extra time to heat up, steam levels were tougher to maintain. In Philadelphia, Wyeth Labs put a temporary embargo on shipment of all "freezable" merchandise throughout the Atlantic seaboard, except where transportation was heated.

But all was pretty much under control by late last week. The only thing that's bothering chemical executives regarding weather conditions right now is the chance that the subfreezing weather is going to continue. All agree they've had enough. Though latest long-range weather forecasts are for below-average temperatures, chemical management men late last week were taking heart from warming trends in most parts of the East.

WIDE WORLD PHOTOS

Educator Johnson, General Taylor link industry aid with defense.

Foreign Trade for Defense

How can U.S. companies best contribute to national security? By increasing their activities in foreign industry and international commerce, according to speakers at last week's military-industrial conference in Chicago.

But there are several other important ways in which industry management can bolster this country's overall strength, the 1,500 delegates were told, by such speakers as Socony-Mobil Oil Co.'s R. Rea Jackson and Army Chief of Staff Maxwell D. Taylor.

The job of improving and expanding the country's technology and production potential, several speakers stressed, is one vital task that is largely in the hands of private industry. Military strength, declared consultant Merriam Trytten, of the National Research Council, rests fundamentally on scientific effort. "Part of this, of course, is the competence and resourcefulness of an extensive establishment in applied science and production. It does not have to be associated with the particular industries obviously related to military production."

It was agreed that industrial research is another big factor in national economic and military strength. A panel on industry, technology, research and education—headed by John Rettaliata, president of Illinois Institute of Technology—found that industry, education and government share mutual responsibility for basic research. Sen. Henry Jackson (D., Wash.) suggested that the federal government should "promptly establish a National New Projects Laboratory under civilian direction."

That management should assume new responsibilities in world politics and international communications was the theme of Thomas Coulter, of the Chicago Assn. of Commerce and Industry. "The voice of business," he asserted, "must be sounded loud and strong where it has not been heard before. Since U.S. commerce and industry are a manifestation of free enterprise, they mirror more than anything else the American way of life to the world at large."

As to automation, there appeared to be some difference of opinion. Robert Trundle, president of Trundle Consultants, said increased productivity through automation is the route to fulfilment of requirements for national security and economic growth as well as "our aspirations for higher levels of general welfare."

Deputy Asst. Sec. of Defense Cecil Milne did not dispute this, but stated that automation of civilian industry "can actually reduce our mobilization base, even though it increases our gross national product." He said this was because an automated production line "isn't always convertible to a new

civilian model, let alone to war production."

But Coulter—in summing up the conference's speeches and discussions—put greatest emphasis on the need for U.S. business and industry to counter the economic warfare being waged by the Soviet Union.

"How can we match the global effort to pre-empt markets and to corner deposits of gold, uranium, iron ore, bauxite, petroleum and manganese?" he asked. "Surely not by imitating Soviet methods. The answer must be found within the scope of private initiative and private investment, in a cooperative approach to problems of business and government."

Accent on Chemicals

Koppers Co. (Pittsburgh) is putting more emphasis on chemicals—despite a conviction that chemical prices are not what they should be.

President Fred Foy says the company is replacing its Chemical Division with two new branches: a Plastics Division and a Chemicals and Dyestuffs Division.

David Eynon, president of Mobay Chemical Co. for the past four years, will head the larger plastics organization and T. C. Keeling, Jr., former assistant vice-president of Koppers' Chemical Division, will be chief of Chemicals and Dyestuffs.

Foy reports that two new plants, one for making high-density polyethylene in Port Reading, N.J., and another to produce expandable polystyrene at Kobuta, Pa., will be on-stream shortly, both under the wing of the new Plastics Division. Other plants to be supervised by the new plastics chief are styrene and polyethylene units in Port Arthur, Tex., Berkeley Heights, N.J., Chicago and Los Angeles.

Keeling will be in charge of plants at Lock Haven and Petrolia, Pa.—the two main units of the new Chemicals and Dyestuffs division.

In line with its new accent on chemicals, Koppers is planning substantial outlays for both new divisions. In Koppers' recently published 1957 annual report Foy declares that in spite of a generally poor chemical price structure, "your management continues to believe that the long-range opportunities in the chemical business will represent a good field for the investment of company funds."

Leaning on Chemicals

With aircraft manufacturing profits being "squeezed," North American Aviation, Inc. is looking to its broadening interests in chemical process activities to stabilize earnings.

Before members of the New York Society of Security Analysts last week, NAA President John Atwood told of his company's growing stake in high-energy propellents and atomic energy.

Atwood — 53-year-old, Kentucky-born aeronautical engineer—holds that liquid propellents will be the mainstay for missiles for "a good many years." He feels that the liquids will generally be the type used where high thrust is required, but that for smaller and less exacting missiles, solids may be preferred because of their ease of handling.

Hercules Studies a Lofty Home

Plans for a new building that would be both a long-time home office for Hercules Powder Co. and the tallest skyscraper in Wilmington, Del., are being studied this week. If negotiations lead to a go-ahead decision, here's what will happen:

- Shapdale Inc.—owner and operator of the Delaware Trust Building at Ninth and Market Sts.—will construct a 22-story addition between the Market and King St. wings of its present building.
- Hercules will lease all the new space from the fourth floor up, and will continue to use nearly all of the office space it now leases in existing buildings.

Shapdale President William du Pont, Jr., says that if construction gets under way this spring, completion would be expected sometime in 1960.

'Big 3' Boost Sales

While chemical sales in the U.S. have been leveling off, those in West Germany have continued up the relatively steep incline they've been climbing over the past decade. And Germany's three largest chemical concerns are all doing better than the national average for their industry.

Over-all, West German chemical companies report that 1957 sales revenues were up by 12.5% over those of '56. But the "big three"—Farbenfabriken Bayer, Badische Anilin- & Soda-Fabrik, and Farbwerke Hoechst—tell of increases ranging from 16 to 20% over 1956 volume (*table, below*).

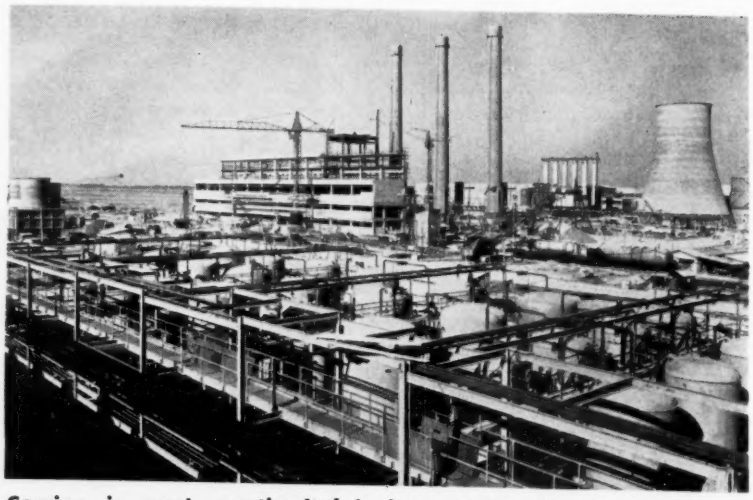
Export Spurt: For each of those three companies, the rise in export business was greater than the increase in sales within West Germany. Bayer's foreign sales mounted by 16.6% to $180.6 million; BASF doesn't specify exact figures but says the increase was more than 20%; and Hoechst boosted its exports by 27% to $138 million. For Hoechst, exports amounted to 33% of total sales; for Bayer, the proportion was nearly 41%.

All three of these companies stepped up their expansion programs in the past year and indicate that this year's capital expenditures will be on the same order as those of '57. Last year, Bayer's plant investments totalled $69 million in Germany and $18 million in other countries. BASF put $54 million into new and improved facilities during '57; and for Hoechst, last year's capital expenditures were $53 million in West Germany and $6.2 million in foreign projects. Hoechst's '58 budget calls for outlays of $53 million and $4.8 million, respectively.

One measure of increasing mechanization and automation in these companies' plants: the small increase in number of employees relative to the large increase in sales. Bayer employment rose 6% to 49,797; BASF, 4.6% to 38,381; Hoechst, 7.9% to 42,739.

Germany's 'Big Three': Sales Are Soaring
(million dollars)

Company	1956	1957	Percent Increase
Bayer	380	441	16.1
BASF	357	429	20.1
Hoechst	352	419	18.9



Coming in next month: Italy's huge rubber-fertilizer complex.

More Rubber for Europe

U.S. synthetic rubber producers face a sudden shrinkage of their European markets as two giant plants near completion in Italy and Germany:

- In Ravenna, Italy, next month, a 35,000-tons/year styrene-butadiene rubber (GR-S) plant will go onstream. By 1960, a second unit will boost capacity to 55,000 tons.
- In Marl, West Germany, a 45-50,000 tons/year GR-S plant will start production this summer.

Italy's $100-million complex in Ravenna (northeast Italy) is the work of Azienda Nazionale Idrogenazione Combustibile, the petrochemicals group of the government's gas and oil syndicate, Ente Nazionale Idrocarburi. It will be Europe's first large synthetic rubber plant.

Until now, Italy has imported practically all of its synthetic rubber from the U.S. In 1956 (last year for which complete figures are available), the U.S. shipped to Italy some 10,023 tons of synthetic rubber, including 7,149 tons of GR-S. This year, with the new plant onstream, Italy will turn out enough GR-S to fill all its own needs, and still have 10,000 tons left over for export. In three years, some 30,000 tons/year will be available for export.

The Ravenna works will also produce nitrogen fertilizer, starting with 400,000 tons/year and reaching full 650,000-tons capacity in '59. About half of this will go for export—stepping up the '57 export rate by almost two-thirds.

Ravenna will have a production cost advantage that may give competitors a hard run. Raw material for the rubber and fertilizer will come from methane fields nearby, which will also fuel the project's 120,000-kw. power station. The methane supply is expected to last at least 20 years.

ANIC will operate the rubber plant under licenses from Union Carbide and Phillips. Both firms provided technical assistance and training, and helped set up the plant.

The nitrogen fertilizer unit will operate under German, French and Italian licenses.

Germany's Venture: With its initial capacity of 45-50,000 tons, West Germany's new plant—owned by Bunawerke Hüls GmbH.—will meet about 25% of domestic rubber needs. Germany's present rubber consumption ratio is now about 70% natural, 30% synthetic. During the first 11 months of '57, the country imported about 32,472 long tons, 96% of this from the U.S. Bunawerke—a joint venture of four large German chemical concerns—plans to put a 28.6¢ a lb. price tag on its GR-S. But U.S. synthetic rubber is now tagged at 27.6¢/lb. in Hamburg, and natural rubber is down to 59¢/lb. Observers expect Bunawerke will bring down its price to meet the competition.

EXPANSION

Copper: Kennecott Copper Corp. has boosted planned capacity of its new electrolytic refinery near Baltimore from 7,000 to 16,500 tons/month. The bulk of Kennecott's copper will come from its Chilean subsidiary, Braden Copper Co. Some will come from its domestic mines.

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Nuclear Power: The Crown-owned Atomic Energy of Canada, Ltd., is planning to build in Toronto a 200,000-kw. nuclear plant that may produce power within the "competitive range of coal-fired stations" by 1965 or '66. The firm has formed a nuclear plant division in Toronto, but will not start construction for four years. The division will also build a 20,000-kw. nuclear power demonstrator plant near Chalk River, Ont. No site has been chosen for the Toronto station.

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Hydrofluoric Acid: Allied Chemical's General Chemical Division will build a fourth hydrofluoric acid plant, this one at Nitro, W.Va. Construction will begin March 1. Both aqueous and anhydrous forms will be produced.

Ferrochrome: The American Chrome Co. (subsidiary of Goldfield Consolidated Mines Co., San Francisco) is building a high-carbon ferrochrome pilot plant near Columbus, Mont. Initial capacity will be 5 tons a day, will eventually increase to 15 tons a day. The firm hopes to "establish this country's first self-sustaining commercial ferrochrome industry based on domestic ore."

COMPANIES

Arthur C. Trask Co. (Chicago), manufacturer of tanning extracts, processed oils and special chemicals, has established a Canadian branch in Toronto, Canadian Arthur C. Trask, Co., Ltd.

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Marquette Cement Mfg. Co. (Chicago) will absorb three of its five cement sales subsidiaries on March 1: Cumberland Portland Cement Co. (Chattanooga), Hermitage Portland Cement Co. (Nashville) and Superior-Marquette Cement Co. (Columbus, O.). Sales organizations and personnel will not be changed.

•

Thiokol Chemical Corp. (Trenton, N.J.) has won two new Air Force contracts for guided missile development work at its Brigham City, La., plant. The awards include a $600,000 engineering contract, and a $150,000 contract for solid-fuel booster rockets. The Air Force is negotiating with Thiokol for additional rocket boosters and other solid-fuel development work.

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Rubber Corp. of America (Hicksville, L.I., N.Y.) has become the sole owner of Insular Chemical Corp. (Hicksville), manufacturer of polyvinyl chloride resin. Rubber Corp. bought Pollak Industrial Corp.'s (New York) interest in Insular.

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International Paper Co. (New York) paid $17 million for property and timber rights of Harbor Plywood Corp. (Aberdeen, Wash.). The firms have also agreed on a $2-million settlement of Harbor's suit against the former Long-Bell Lumber Co., which merged with International in '56. Harbor is discontinuing its general plywood line and will concentrate on specialty plywood products.

FOREIGN

Copper/Peru: Southern Peru Co. will spend $200 million developing its Toquepala copper mine. Mining operations will start in '60 at the rate of 30,000 tons/year of blister copper, and will eventually swell to 120,000 tons/year. American Smelting and Refining Co. owns 58% of Southern Peru's stock. The other owners are Cerro de Pasco Corp. (16%), Phelps Dodge (16%), and Newmont Mining Corp. (10%). Southern Peru owns three deposits (including Toquepala), which total more than 1 billion tons of ore.

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Polyvinyl Acetate/Argentina: Farbwerke Hoechst AG. (Frankfurt) and Compania Quimica (Buenos Aires) will build a polyvinyl acetate plant in Lavallol, Argentina. Production is slated to start by the end of this year.

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Plastics and Fibers/Germany: New figures this week give more evidence (*CW Business Newsletter, Feb. 15*) of West Germany's chemical boom:

- Plastics production last year consolidated West Germany's position as the world's No. 2 producer. Output increased 22% over the '56 level, from 529,000 to 645,000 tons. Polymers accounted for the biggest jump (24%), from 246,000 to 305,000 tons. Condensation products rose from 216,000 to 258,000 tons, a 19% jump. And production of cellulose derivatives increased 21%, from 68,000 to 81,000 tons. Total plastics sales rose 34%, from $284 million to $376 million.
- West Germany continued to hold fourth place in world production of synthetic fibers (after the U.S., Japan and England). Production in West Germany jumped almost 35% last year, from 15,730 tons in '56 to 21,230 in '57. Output of cellulose-based fibers had only a 5% advance, to 78,760 tons. And production of acetate and staple fibers increased only 4%, to 196,130 tons.

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Polypropylene/Japan: Mitsui Chemical Industry Co., Ltd., has agreed to pay Montecatini $500,000 and a 5% royalty for 15 years for a polypropylene license. The agreement must be passed on by the Japanese government.

NEW TAX CLIMATE

for your new plant

The fact that Pennsylvania manufacturers will save an estimated $45 million in taxes during the current biennium proves our point. To create this "tax climate" favorable to new and expanding industry, the state legislature has taken these steps:

1. Exempted manufacturers from capital stock and franchise tax.
2. Eliminated local *ad valorum* property taxes on machinery and equipment (there is no state-level general property tax).
3. Repealed tax on stock transfers.
4. Made 3% sales tax permanent—now the principal source of state revenues.
5. Reduced the sales tax on purchases by manufacturers.

Add the fact that Pennsylvania has no state personal income tax, and you can see how all this creates a favorable tax climate. Use the coupon below for details.

W E S T P E N N P O W E R

an operating unit of the WEST PENN ELECTRIC SYSTEM

Hello . . .

I'm Charlie Fife. I want to stress the point that this good tax news is only one of many facets that interest manufacturers in expansion in WESTern PENNsylvania.

For example, we have communities offering **100% financing** in attractive lease/purchase agreements; interest as low as 2%, with deferred amortization, can be applied on up to 50% of total plant cost.

Skill surveys and labor inventories in our files show the true picture of **labor availability,** both male and female.

We'll gladly assign a **plant location specialist** to personally assist in your evaluation of WESTern PENNsylvania. There is no charge for this professional service. And, you can be sure that West Penn Power will respect your confidence.

CHARLES M. FIFE, *Manager*
Area Development Department

WESTern PENNsylvania

WEST PENN POWER, Area Development Department, Cabin Hill, Greensburg, Pennsylvania CW-1

Yes, I'm interested in WESTern PENNsylvania:

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Name_____ Title_____

Company_____ Street_____

City_____ Zone_____ State_____

Washington
Newsletter

CHEMICAL WEEK
March 1, 1958

The Navy is ready to lease the government's oil-shale plant and facilities at Rifle, Colo., as soon as the Justice Dept. gives a go-ahead signal. The plant—mothballed for several years—will be available to private industry on a five-year leasing contract.

The Administration believes enough public money has been spent on oil-shale research and that industry should now get a chance at the government plant.

A number of oil companies and mining firms are believed to be interested in leasing the Rifle plant. Union Oil Co. of California—a leader in private oil-shale development—has recently announced it can produce oil from shale at less than $1/bbl. Union has retorting facilities at Grand Valley, Colo., in the same area as the government plant.

•

The Federal Reserve governors are using psychology, trying to whet industry's appetite for loans. Last week's action—the board's reduction of reserve requirements for 6,400 member banks—is plainly an anti-recession move. The question is: How effective will it be?

Here's what happened:

In fact, the governors released about $500 million—money that the banks have heretofore been forced to keep in reserve, out of circulation, against their demand deposits. The governors released the $500 million by the simple expedient of dropping the reserve requirements a half-point.

In theory, the banks are now capable of making about $3 billion in loans that they couldn't make before. In practice, and the board acknowledges this, the lending reservoir will be freshened by considerably less than that sum. No one knows how much, and it isn't even important right now. What is important is that there is actually a substantial new credit pool for business to draw on.

The hooker: Does industry want to borrow? Only a few hours before the board of governors announced the decision, Chairman William McC. Martin told Congress that a fresh survey showed most member banks had more money to lend than businessmen could absorb. Only in a few individual banks is there a shortage of available funds for lending.

The Federal Reserve, by moving early, is advertising to business that loans can be had for the hoped-for upturn by spring. Further evidence of the psychological nature of the move is its timing. It was expected, but logically it would have come five or six weeks hence—when, and if, the demand for loans started to pick up. In this light, the board's move must be read as a part of Washington's concerted drive to establish a general feeling of optimism in the business world.

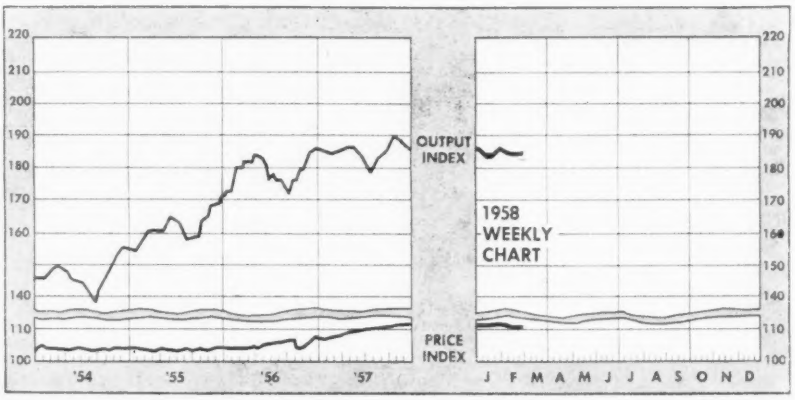
New-Dealing Senator Kerr replaces conservative Senator Byrd on the important-to-tax-policy Senate Finance Committee. Byrd won't run for re-election in Virginia this fall. Kerr becomes chairman of the committee, assuming the Democrats keep control of Congress—which most experts expect. In years past, conservative Southern Democrats such as Byrd, and George of Georgia, have been relied on by business interests to make sure that tax and other financial legislation is as "sound" as political realities would permit. With Kerr coming up, things will be different. He has already turned his sharp and caustic tongue on Eisenhower and his economic policies. He wants tax cuts and public works pump-priming now to counter the business recession. He favors an immediate boost of $100 in individual exemptions to beef up consumer purchasing power. He's against any cut in corporate and excise taxes.

•

Russia is stepping up its exports to Western markets at the same time U.S. and other producers are looking for more sales around the world.

The Soviets are selling oil to Japan, and aluminum, tin, tungsten, and zinc to other Western markets in increasing quantities. Russian production of a number of base metals has been increased.

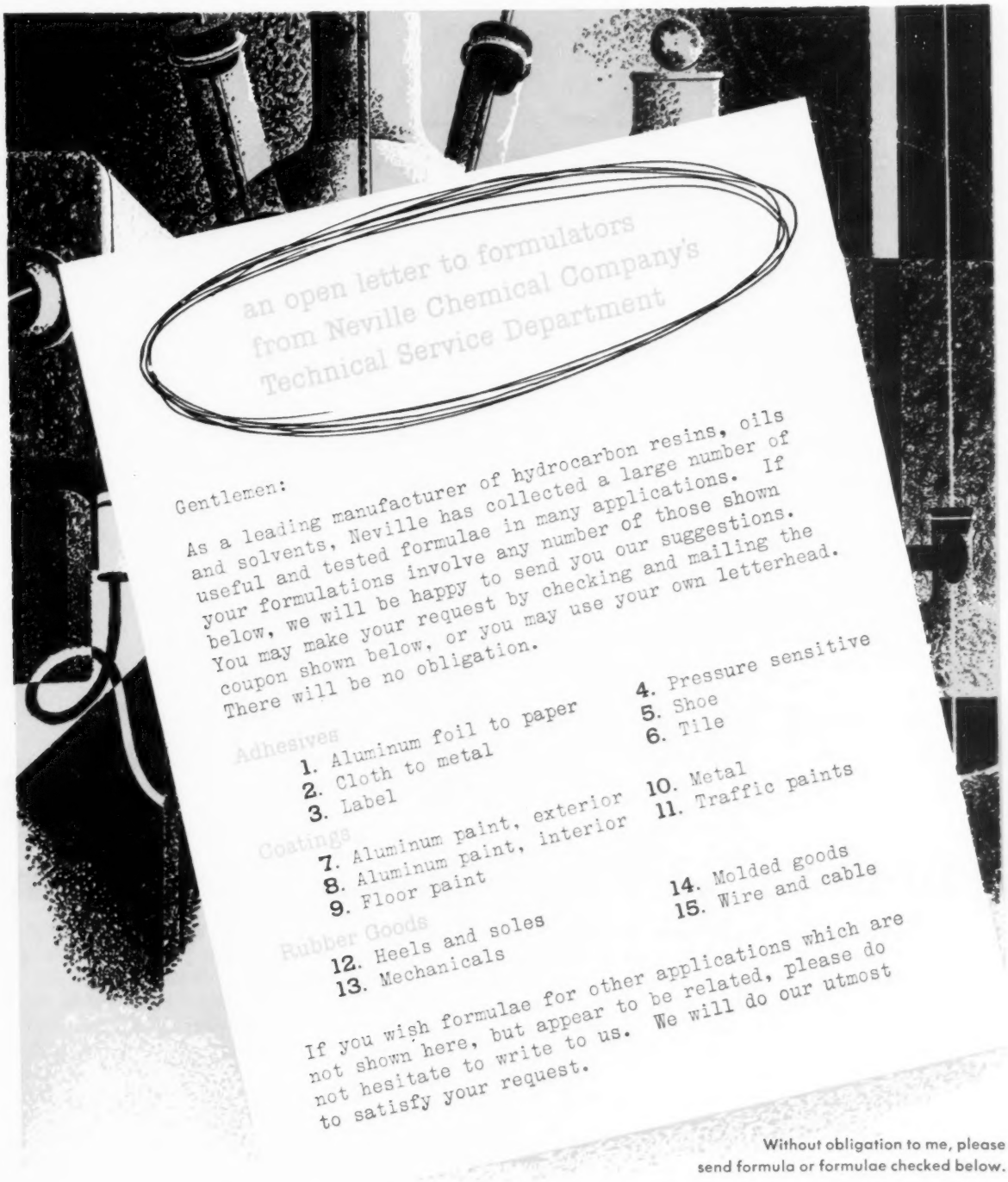
U.S. exports to Russia and the satellite countries are increasing. They were up nearly $41 million during the first 9 months of last year; Poland is responsible for much of the increase. Items involved: wheat, bituminous coal, iron, steel, dairy products, farm machinery, tallow.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	183.5	185.5	186.5
Chemical Week wholesale price index (1947=100)	110.9	110.7	108.7
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	39.53	39.81	41.28

MONTHLY Production (Index 1947-49=100)	Latest Month	Preceding Month	Year Ago
All manufacturing and mining	132	133	145
All chemical products	181	184	184
Industrial chemicals	197	200	207



Gentlemen:

As a leading manufacturer of hydrocarbon resins, oils and solvents, Neville has collected a large number of useful and tested formulae in many applications. If your formulations involve any number of those shown below, we will be happy to send you our suggestions. You may make your request by checking and mailing the coupon shown below, or you may use your own letterhead. There will be no obligation.

Adhesives

1. Aluminum foil to paper
2. Cloth to metal
3. Label
4. Pressure sensitive
5. Shoe
6. Tile

Coatings

7. Aluminum paint, exterior
8. Aluminum paint, interior
9. Floor paint
10. Metal
11. Traffic paints

Rubber Goods

12. Heels and soles
13. Mechanicals
14. Molded goods
15. Wire and cable

If you wish formulae for other applications which are not shown here, but appear to be related, please do not hesitate to write to us. We will do our utmost to satisfy your request.

Without obligation to me, please send formula or formulae checked below.

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Please send necessary sample or samples of Neville products necessary for experimentation.

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Company _____

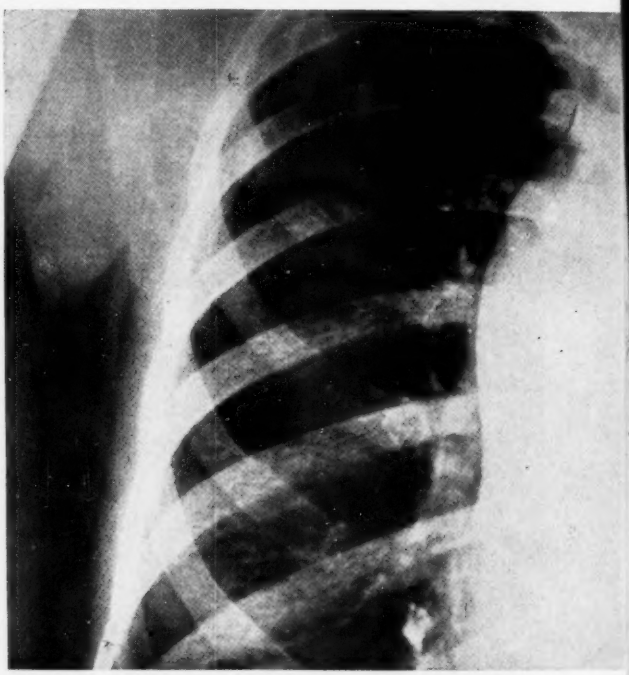
Address _____

NC34-CW

NEVILLE

Plastics like these (below), employed within the body to replace

Plastic	Use
Nylon	blood vessels
Dacron	" "
Teflon	" "
Formaldehyde-treated polyvinyl alcohol sponge (Ivalon)	" "
Vinyl chloride-acrylonitrile (Vinyon-N)	" "
Orlon	" "
Polyethylene (low density)	heart valve
Polyethylene (high density)	stomach wall support
Polyurethane	cosmetic plastic surgery
Cellulose acetate	nerve regenerator
Silicone rubber	heart valve, aorta



Plastic, ball-float valve replaces faulty aortic valve.

Humane Role for Plastic: Substituting

In surgical amphitheatres, chances are fair that one of the plastics (above) will this week play a role as substitute for a failing human structural part. Thanks to research by surgeons—aided in no small measure by plastics makers—such operations are becoming fairly commonplace. And while there's little commercial significance in this expanding use of plastics, cooperating industrial firms feel their effort has brought the rewards inherent in public service.

The scope of this research was brought out recently at a meeting of several hundred workers in the field —mainly surgeons, but including some industrial representatives—at the Rockefeller Institute in New York. The conference* helped delineate the methods and problems involved in artificial internal organs.

Conferees agreed that plastics, particularly in textile form, will become increasingly important in surgery.

Pipelines to Health: Blood vessel replacement with woven plastics now offers the major opportunity. Dr. Ralph Deterling, of New York's College of Physicians and Surgeons, tells *CW* that nylon, Dacron and Teflon now appear best suited for this purpose. Nylon meets all requirements (*see chart*) but loses its strength—as much as 90%—if used in low (40 or 70) denier form. Dacron, which features low water absorption and high strength retention, appears to have an edge on nylon. Teflon, newest plastic to be used in fiber form, is tough, inert, easily sterilized, but is hard to weave and tends to leak its contents.

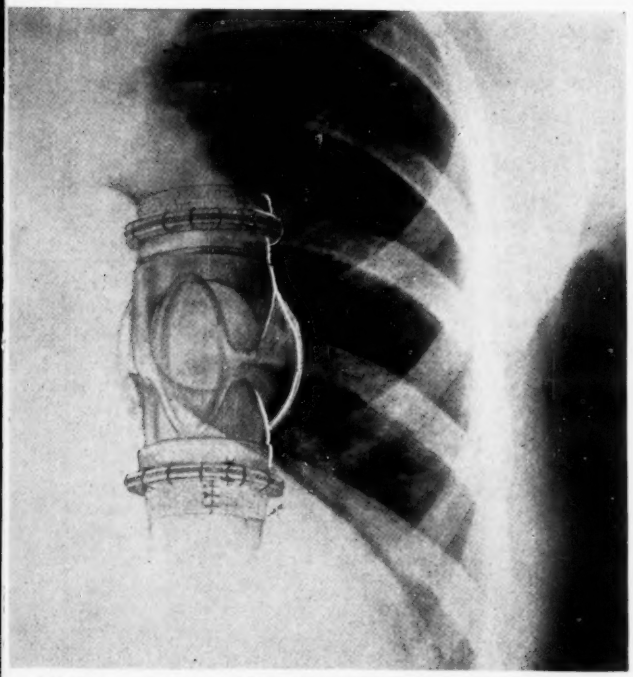
Although most blood vessel replacement has been with woven or knit polymer fibers, some surgeons have tried Ivalon (foamed, formaldehyde-treated polyvinyl alcohol). Ivalon can be conveniently compressed and shaped, but it may rupture easily. It may also irritate surrounding tissue.

Whatever the material used, the surgeons must also consider such engineering principles as the effect of its surface on blood flow, its likelihood of causing a breakdown of blood cells because of turbulence it might cause.

Parts Unlimited: Plastics are bidding for wider use in prosthesis. Heart valves (*see cut*), such as those re-

*Sponsored by the institute's medical electronics center; American Society for Artificial Internal Organs; and the professional group on medical electronics of the Institute of Radio Engineers.

either defective or weakened organs, should possess these traits:



Valves are in use, but improvements are being made.

1. **Chemical inertness.**
2. **Dimensional stability.**
3. **Absence of irritating effects on body cells and tissues.**
4. **Freedom from carcinogenic effects.**
5. **Absence of allergy-causing characteristics.**
6. **Simplicity and low cost of fabrication.**
7. **Durability—no loss of tensile strength when in the body for long periods of time.**
8. **Resistance to loss of size, shape or strength when sterilized.**

for Various Faulty Parts of the Body

cently developed by Dr. Charles A. Hufnagel, Georgetown University medical school (Washington), have been made of silicone rubber or nylon. (Dow Corning has been particularly active in studying medical applications for silicones. Last year, the firm published "Silicones in Medicine and Surgery," written by its assistant director of research, Rob Roy McGregor.)

Some day, plastics may also help promote nerve growth. In animal studies, New York physician James Campbell has used cellulose acetate made with small (0.5-micron diameter) pores to connect damaged nerve endings, facilitate their joining.

At Baylor University (Waco, Tex.), Dr. Francis Usher has been investigating Marlex (Phillip's high-density polyethylene) fabric to bolster abdominal tissue in hernia victims. Tantalum and other metallic meshes, used for this purpose since 1946, are apparently less durable. Another contender for tantalum's duties—in jawbone surgery—is methyl methacrylate.

However, metals continue to be highly important in prosthetics. Silver, once widely used, has been edged out by tantalum (which is less irritating to tissue) in skull plates, bone-joining pins and nails. Titanium and zirconium are also well established. Oregon Metallurgical Corp. (Albany, Ore.) is among the metals firms active in prosthetic research For Zimmer Mfg. Co., an Indiana surgical supply firm, OM has been developing a titanium ball joint to fit in the hipbone socket. Titanium is frequently the choice for large parts because of its comparative lightness. Foote Mineral Co. (Philadelphia) has supplied zirconium for surgical use.

So far, surgeons haven't been entirely satisfied with the help they have had from plastics suppliers. While the latter are usually quick to supply technical information and assistance on existing plastics, they haven't pushed programs to find new plastics specifically suited for prosthesis. But doctors do not blame anyone in particular.

They concede that it is difficult to define just what is needed in new plastics; consequently, there are no specific guides to synthesis research. Meanwhile, the effort to utilize existing plastics continues with what many believe are highly encouraging prospects.

RESEARCH

Paint Progress

Paint researchers gathered a few days ago at the University of Florida (Gainesville), picked up some potentially money-making pointers. The meeting, a one-week "course" directed by the university's Prof. Henry Payne, disclosed new research on protecting paints against microorganisms and progress in preparing exterior emulsion paints.

Richard Ross, of Buckman Laboratories (Memphis, Tenn.), disclosed that bacteria are normally present in paint films and that they are a possible cause of deterioration. In particular, *Flavobacterium* has been found in both oil and emulsion paint films, suggesting that paint films contain more water (needed for bacterial growth) than previously suspected—or that these microorganisms require less water for survival than thought heretofore. Ross believes mercurial and phenolic agents give paint only partial protection against microorganisms. He suggested a product recently patented by his firm: barium *m*-borate (U.S. Patent 2,818,344).

The merits of various types of exterior emulsion paints were reviewed by Rohm & Haas' Gerould Allyn (acrylics), Dow's Norman Peterson (styrene-butadiene) and Shawinigan Resins' Herbert Terry (polyvinyl acetate). Their consensus: paint formulators should select an emulsion in terms of over-all paint properties desired, should not look for any "inherent superiority" in any one vehicle.

Next step for emulsion paints, they also agree, is overcoming problems that limit use of emulsion paints on bare wood—namely the grain-raising caused by water in the emulsions, and the high vapor transmission of the dried films.

APPARATUS

Beryllium-Uranium Detector: A new model of the Galvanek-Morrison Fluorometer can be used to analyze for trace quantities of beryllium and uranium in solution. Previously this equipment, available from Jarrell-Ash Co. (Newtonville, Mass.), was usable for detecting uranium in solids only.

•

Lab Chiller: Lab quantities of dry ice and dry snow can be made with Rolf Darbo's (Madison, Wis.) new carbon dioxide chiller. The unit is

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RESEARCH

suggested for convenient testing of cloud points of liquids, viscosities of oil at low temperatures, and for spot chilling.

•

Five-Minute Chromatograph: Precision Scientific Co.'s (Chicago) new Hi-Speed Paper Chromatograph offers separation accelerated by centrifugal force, permits simultaneous, multiple-sample testing. Price: $250.

EXPANSION

• Geigy Chemical Corp.'s pharmaceutical division has opened its first basic research labs in the U.S., at Ardsley, N.Y., for biochemical, organic and pharmacological studies.

• Rocketdyne, division of North American Aviation (Canoga Park, Calif.), has opened its new research center in the Santa Susana Mountains, will do basic and applied research on rocket engines.

Ultrathin Oxide Wafer

This aluminum oxide film, only about one-twentieth as thick as the wave length of light rays passing through it, is still strong enough to support the spider, as shown. The film, prepared at Westinghouse Research Laboratories (Pittsburgh), is made by oxidizing aluminum foil, dissolving away first the oxide from one side (using caustic), then removing remaining aluminum metal by means of acid. The ultrathin films can be used in experimental electronic tubes and in basic research on the properties of matter.

positive action against air pollution

Positive action, resulting from an aggressive, industry-wide air pollution policy is rapidly replacing the outmoded philosophy—"wait until someone complains . . . or sues." Today good community relations can be as vital and profitable as increased production efficiency.

Dracco Dust Control Equipment—performance-proved in countless applications—is one of industry's most effective allies in this fight against air pollution. Dracco filtration methods assure 99½-100% air cleaning by trapping dust at its source to prevent both internal and external atmosphere contamination.

The National Supply Company solved an air pollution problem and met the stringent requirements of smog-conscious Los Angeles County. The company installed a special Dracco Dust Control system to prevent escape of waste oxides from its electric furnaces.

If your dust problem involves air pollution, recovery of valuable dust or elimination of nuisance dust, Dracco can help you take the positive action needed to solve it. For information call or write Dracco today.

DRACCO DIVISION OF FULLER CO.
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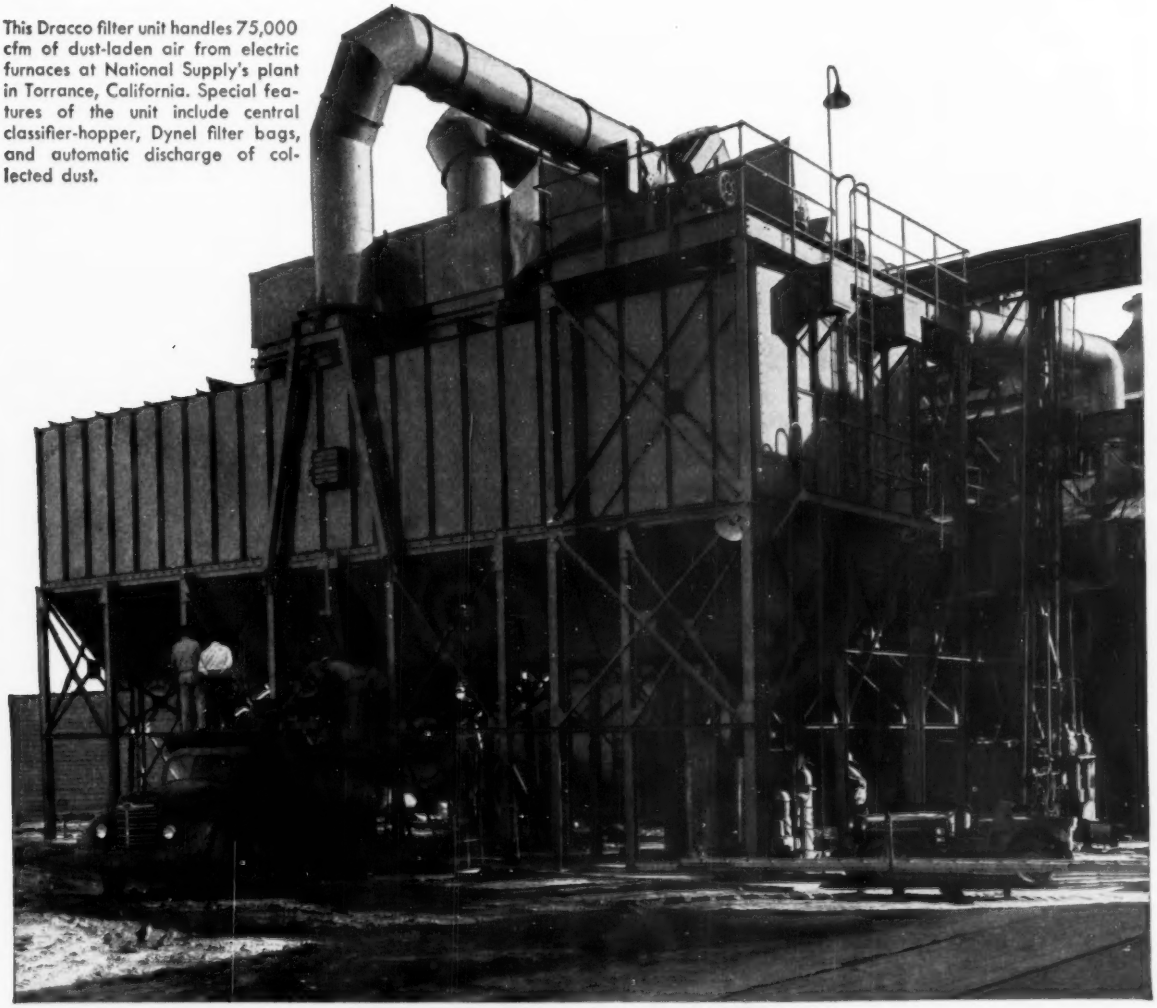
This Dracco filter unit handles 75,000 cfm of dust-laden air from electric furnaces at National Supply's plant in Torrance, California. Special features of the unit include central classifier-hopper, Dynel filter bags, and automatic discharge of collected dust.



Complete 40-page catalog on Dracco Dust Control Equipment contains detailed data and valuable reference material. Write for Bulletin 800.

DRACCO *airstream* conveyors
dust control equipment

Specialization: A Must in Specialties?

The scientific advances that are making life easier for the buying public are bringing radical changes in the chemical specialties field. That's the contention of Wilfrid S. Jessop, president of Chicago's U.S. Sanitary Specialties Corp. Last week, in an interview with CW, he outlined how the main change—toward specialization—has brought new problems, and advantages, to the specialty maker.

Jessop explains that "the developments of modern technology are so varied that the producer must—to maintain customer satisfaction—narrow his field and become a specialist in one segment of his industry."

He says that, if his salesmen (he calls them "sales engineers") are to be experts in, say floor maintenance, "it is becoming impossible for them to also sell products for washroom maintenance, skin cleaning, pest control, and all the 100-and-one other specialties that heretofore have been lumped under the classification of janitor supplies."

Too Much Ground to Cover: There are about 6,000 sellers of janitor or sanitary maintenance supplies in the U.S. Of these, Jessop estimates, only about 100 are manufacturers. And he says that none of the 100 can hope to keep abreast of the entire field of sanitary supplies and maintain a complete line—one that will meet every quirk that develops.

"Thirty years ago", says Jessop, "you could call on any concern and sell soap that would clean any existing floors. Today—in addition to hard and soft wood—you have asphalt, vinyl, mastic, linoleum, rubber, marble and other stones, cork, masonite, and other new floor surfaces. The sales engineer must be a specialist to know what kind of preparation, treatment, finish and maintenance the various surfaces require."

Jessop maintains that the salesman must also survey the customer's needs and prepare an efficient maintenance program. He must also train the customer's maintenance staff; and he must provide the equipment that will enable the customer to use the products in the most productive way. "Even the best products won't be bought unless expert service is part of the deal," says Jessop.

Broad Lines Bring Problems: A manufacturer who tries to keep up with every wrinkle in the sanitary specialties field will eventually go under, Jessop believes.

Specialty maker Jessop: His contention is that specialty makers must limit their field or risk failure.

He cited several problems that a continually broadening product line brings:

• Cost of versatile production facilities. "In the old days, a manufacturer made one disinfectant, one cleaner, one soap, one wax—and the customer was content. Today, a manufacturer who tries to produce the cleaners, detergents, soaps, sealers, waxes, disinfectants, deodorants and insecticides to meet all customer needs would require vast facilities. He would have tremendous manufacturing costs—and probably would not have sales to justify them."

• The handicap of a huge inventory. A broad product line necessarily calls for a large inventory. That ties up money. It also requires more warehouse space—representing still more invested capital.

• The technical problem of product development. A broad product line, kept up to date as new building materials are developed and commercialized, would have to be constantly reconstituted and tested. This would require laboratories and scientific personnel beyond the scope of most manufacturers.

Enlarging on the last point, Jessop cites his own case: "We have two laboratories now—one for research and one for testing. But we have outgrown these facilities and must build two new labs—much larger ones—equipped with all the scientific instruments within our means."

The customer today wants standardization, maintains Jessop. Some even check products to be sure that they can be depended upon to do the same job each time. "The old-time jobber could substitute a 50¢ ingredient for a 60¢ one and keep the same label and price on his product. The customer didn't know the difference. Now he does. This kind of manufacturer, consequently, is going out of business," asserts Jessop. "The specialties manufacturers that have their own research labs will be those the purchaser can depend on. They can give the right twist to applied research on the finished products used in maintenance."

"The manufacturer must also keep up to date by continuous cooperation," he says, "with the sales engineers, who service the customers and know their problems. The producer who stands pat on a once-successful formula simply cannot compete."

Specialization within the specialties field—concentrating on one segment of the industry—minimizes these three problems, Jessop says.

Although competition has forced it, there are some disadvantages of "the barbarism of specialization."*

"Like any business, we depend on customer satisfaction. As manufacturers, we have a natural tendency toward simplification—by specialization. But as realistic salesmen, we know too that we must have as broad a line as possible because purchasing agents don't like to deal with a dozen firms. They like to be able to call in one salesman, tell him what they want, and have him supply it," comments Jessop.

"Although we are trying to educate purchasers away from this relatively old-fashioned method of purchasing, it also has an advantage for the salesman: it shuts his competitors out. With specialization comes the danger that the competitor can get a toe-hold with our customer with one product and then expand his sales at our expense.

"That's why there's a limit to specialization. When you reduce your line to the point where the customer isn't satisfied, you're in trouble. Happy customers don't switch horses, so to speak."

Jessop adds: "We must still carry things that we don't make much money on. Appliances for cleaning, mops, etc. But it's the sugar on the customer's cake, and it's necessary."

Jessop says that the trend toward specialization in specialties probably can be traced to the tremendous advances made by science in making living more comfortable since World War II. He adds that his own company realized about five years ago that its field was becoming too broad and that specialization must come.

"We decided to concentrate on floor maintenance," he says. "We weren't to exclude the sale of other sanitary specialties, but floors would be our specialty. Today, our line of products for floor maintenance (waxes, sealers, cleaners, polishes, etc.) is equal numerically to our entire line of sanitary supplies 30 years ago."

Jessop hastens to point out that not all firms choose to specialize as his did. Some firms specialize in custom-

*Jessop, a lawyer before he entered the specialties field, chose the words of the Spanish philosopher, Jose Ortego y Gasset.

Stain rating chart for better evaluation of caulking compounds developed at Amoco Chemicals

To help caulking compound manufacturers make better products, Amoco Chemicals technical service men are conducting long-range product improvement and evaluation studies on caulks. Five evaluation tests have been developed. One of these is a new system for recording and comparing caulking compound stain.

And caulking compound manufacturers make better finished products by using INDOPOL Polybutenes in their formulations. INDOPOL Polybutenes are a series of synthetic, high-molecular-weight, viscous, liquid hydrocarbons. Six grades are available in a viscosity range from 40.6 to 15,300 SSU (at 210° F.).

Put these two together: (1) Amoco Chemicals technical service (2) INDOPOL Polybutenes, and you have the reasons why Amoco Chemicals is becoming an important new resource for industry.

Perhaps Amoco Chemicals can help you improve your caulking compounds using INDOPOL Polybutenes or help you develop new products employing Polybutenes. Your inquiry will receive a prompt reply.

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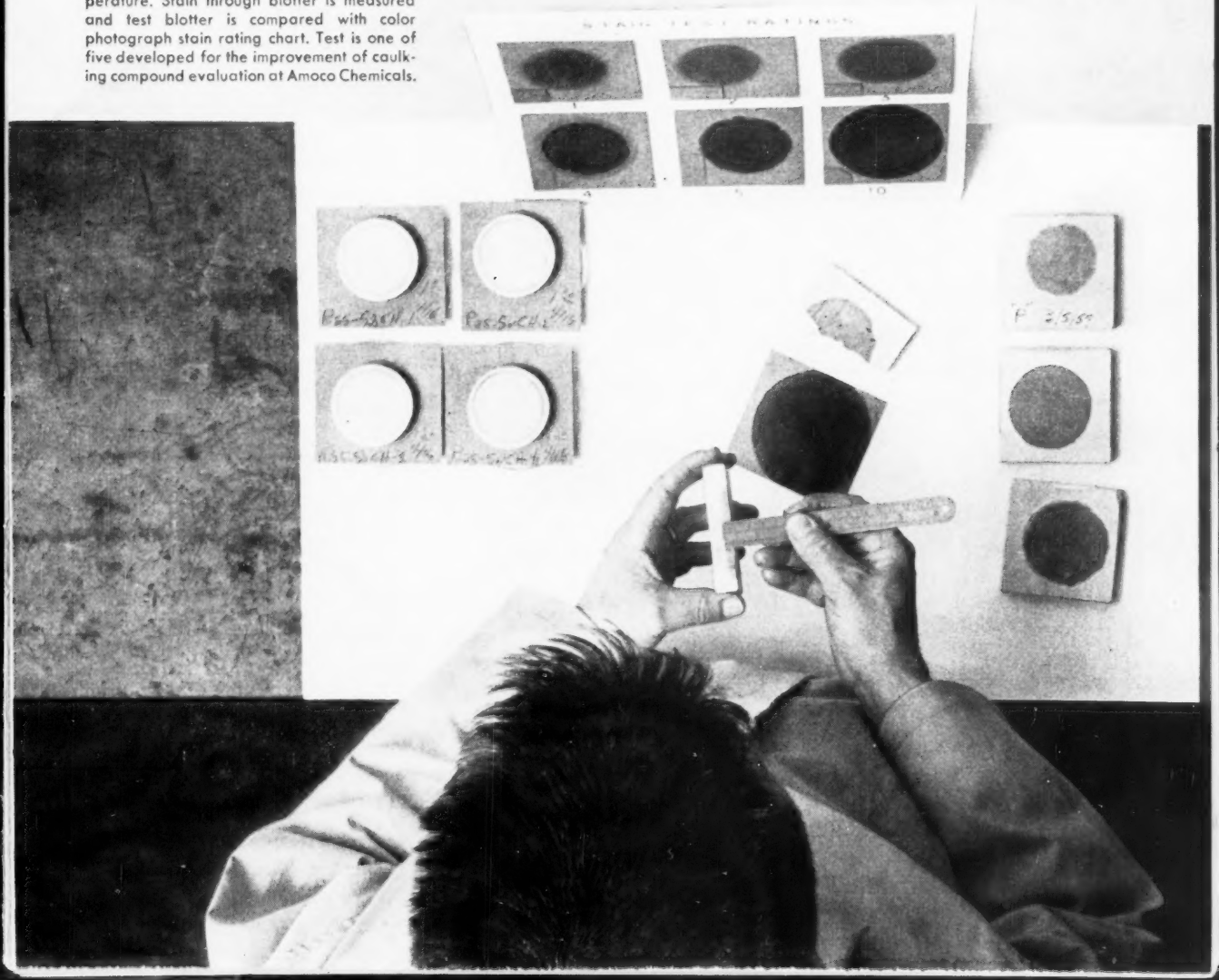
Stain rating test for caulking compounds. Caulking compound is put in a standard ring on a blue blotter of specified weight and allowed to stand for 72 hours at room temperature. Stain through blotter is measured and test blotter is compared with color photograph stain rating chart. Test is one of five developed for the improvement of caulking compound evaluation at Amoco Chemicals.



ers, rather than products—they supply hospitals, or stores, or schools, exclusively.

"I don't believe the manufacturer will ever object to specialization," Jessop summed up. "But the sales-minded sales manager will. Somewhere there must be a compromise that will maintain sufficient customer satisfaction while still allowing sales to grow."

PRODUCTS

Organic Flocculant: Polyox coagulant, an organic flocculating agent, has just been added to Union Carbide's Polyox family of water-soluble resins. Carbide says its white crystalline product can be used to increase throughput of plant thickeners and filters because of its high flocculation efficiency. Application rate varies from 20 ppm. up to 2% of weight of the suspended solids.

•

Metal-Ion Controller: Versenex 80, a chelating agent based on diethylenetriamine, is now being produced in commercial quantities by Dow Chemical. Dow is recommending Versenex 80 in cases where metal-ion control by other chelating agents has been only partly successful. According to Dow, the new product is particularly effective in controlling iron ions.

•

Gas Guide: Air Reduction Co., Inc. (New York), has just come out with a 24-page brochure on gases used in the food industry. Called "Facts on Gases Used for Food Products," the booklet describes recent trends in blanketing, pressure packaging, quick freezing and chemical processing of foods. There are also sections on how to select a gas, on delivery, storage, and handling techniques.

•

Rings and Chains from Xylene: Diamond Alkali Co. (Cleveland) has added six new *p*-xylene-based compounds to its list. Three are ring-chlorinated, and three are chain-chlorinated compounds. The ring-chlorinated group (2,5-dichloro-*p*-xylene; 2-chloro-*p*-xylene; 2,3,5,6-tetrachloro-*p*-xylene) can be used as intermediates in polyester and polyether production. Diamond also expects the ring group to find extensive use as solvents, flame retardants and in the formulation of hydraulic fluids.

Because of their great reactivity (in nitration, sulfonation, oxidation, chlorination and chloromethylation processes) the chain-chlorinated materials (α-chloro-*p*-xylene, α,α′-dichloro-*p*-xylene and α,α′-hexachloro-*p*-xylene) are being pushed as intermediates for food flavors, perfumes, insecticides, fungicides, dibasic acids and glycols. The six new compounds are now in pilot-plant scale production at Diamond's organic chemicals plant (Newark, N.J.).

•

Versatile Dispersant: Pliovic VO, a polyvinyl chloride dispersion resin, is now being marketed by the Chemical Division of Goodyear Tire & Rubber Co. According to Goodyear, Pliovic VO, developed for plastisol and organosol applications, has exceptional electrical properties and low water absorption—it shows a 1% weight gain when immersed in 158 F water for 20 hours. Suggested uses: cable covering, wire coating, rotational molding operations, and potting compounds.

•

Picture Paper: Kodak Panalure Paper E, a panchromatic enlarging paper designed to permit photographers to make black-and-white prints from color negatives, is now commercially available from Eastman Kodak Co.

•

Wax Table: Baker Castor Oil Co. (Bayonne, N.J.) has recently published a one-page chart listing the physical properties of its 37 natural and synthetic waxes. The data includes melting and congealing points, densities at various temperatures, penetration values and viscosities of the molten waxes.

•

Versatile Diepoxides: Two new diepoxides, dicyclopentadiene dioxide and limonene dioxide, are now available from Becco Chemical, division of Food Machinery and Chemical Corp. (Buffalo, N.Y.). Becco says the new epoxy compounds can be used in perfumes, cosmetics, pharmaceuticals, adhesives, lubricants and in organic synthesis.

•

Antigerm Rinse: Vic-Kum Chemicals, Inc. (Milwaukee) has just introduced a germicidal rinse, called MEL-O-9 (chloromelamine), for rinsing food processing equipment, glassware and dishes.

QUIZ

For Multiwall Bag Buyers

"How Does Your Packaging Operation Rate?"

1. Is your bag correctly sized for your product?
2. Is your bag properly constructed for your product?
3. If loss of product is caused by deterioration, would special protective sheets help to reduce such loss?
4. Is the total cost of your bag out of proportion to the selling price of your product?
5. Does your product cost warrant redesigning your bag to merchandise your product more effectively?
6. Are you using the most economical filling machine available for packaging?
7. Are your current suppliers giving you the service you desire?
8. Are your suppliers integrated and capable of maintaining dependable service at all times, under all conditions?
9. Are your suppliers' representatives qualified to help you with your packaging, sales promotion and marketing?

Perhaps we may be able to help you to arrive at the right answers in order to achieve higher production at lower costs.

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- St. Marys Kraft Corp.
- Gummed Tape Div.
- The Gilmanized Corp.
- Kraft Bag Corp.

☐ O.K. Kraft... Help me to answer your Quiz. Please have representative call.

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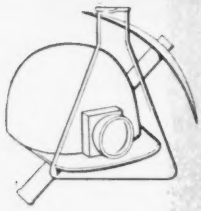
PRODUCT MFD._____

NAME_____

TENNESSEE CORPORATION



INDUSTRIAL CHEMICALS

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COPPER SULFATE	Industrial Crystals and all common grades.
MONOHYDRATED COPPER SULFATE	35% Copper as metallic packaged in steel drums at no extra cost.
COPPER CARBONATE	55% Copper as metallic. Light and dense grades.
CUPRIC CHLORIDE	37% Copper as metallic. Available in polethylene-lined drums or bags.
CUPRIC OXIDE	Minimum 76% Copper as metallic. Technical grade . . . NOT A BY-PRODUCT.
SULFUR	
SULFURIC ACID	Various strengths and grades 60° through the Oleums. Available in tank cars or tonnages.
LIQUID SULFUR DIOXIDE	Highest commercial quality, available in tank cars, tank wagons, ton cylinders and 150-lb. cylinders.
CHLOROSULFONIC ACID	Iron less than 1.0 ppm as loaded. Water white. Delivered in glass-lined tank wagons, also in stainless steel drums.
SODIUM HYDROSULFITE	T-C HYDRO is a dry, white, free flowing, crystalline powder of uniform particle size and structure. It is dust free, assuring highest stability and uniformity.
PARA TOLUENE SULFONIC ACID, ANHYDROUS	Other organic Sulfonic Acids.
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MONOHYDRATED ZINC SULFATE	36% Zinc as metallic. White, free flowing powder.
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Connecticut Turnpike is one facet of state's excellent highway system, an eminent advantage as . . .

Chemical Makers Move into Connecticut

Rumbling down Connecticut's major turnpikes these days are increasing quantities of chemicals turned out by the state's flourishing chemical processing industries. Today, the chemical industry there adds an estimated $160 million in value to raw materials, a striking contrast with the value-added figure of $52.3 million in '47, and $142.1 million in '55.

Though these figures may seem small in comparison with those of giant New Jersey ($1.257 billion), in value added in '55, the Nutmeg State, nevertheless, ranked 21st among the 48 states in value added by manufacture (it's 28th in order of population). Moreover, in terms of construction planned, under way and completed for '58 and '59, says the Manufacturing Chemists' Assn., the state ranks 31st, with a total of $15.7 million. Construction under way: $11 million; planned, $1 million.

Land of Specialties: The greatest part of Connecticut's chemical manufacturing is in specialty items ranging from rust inhibitors to nickel-plating solutions. Ranking close in value of output to the mass of small specialty outfits, however, are pharmaceutical producers, probably led by production at Chas. Pfizer & Co.'s huge Groton plant.

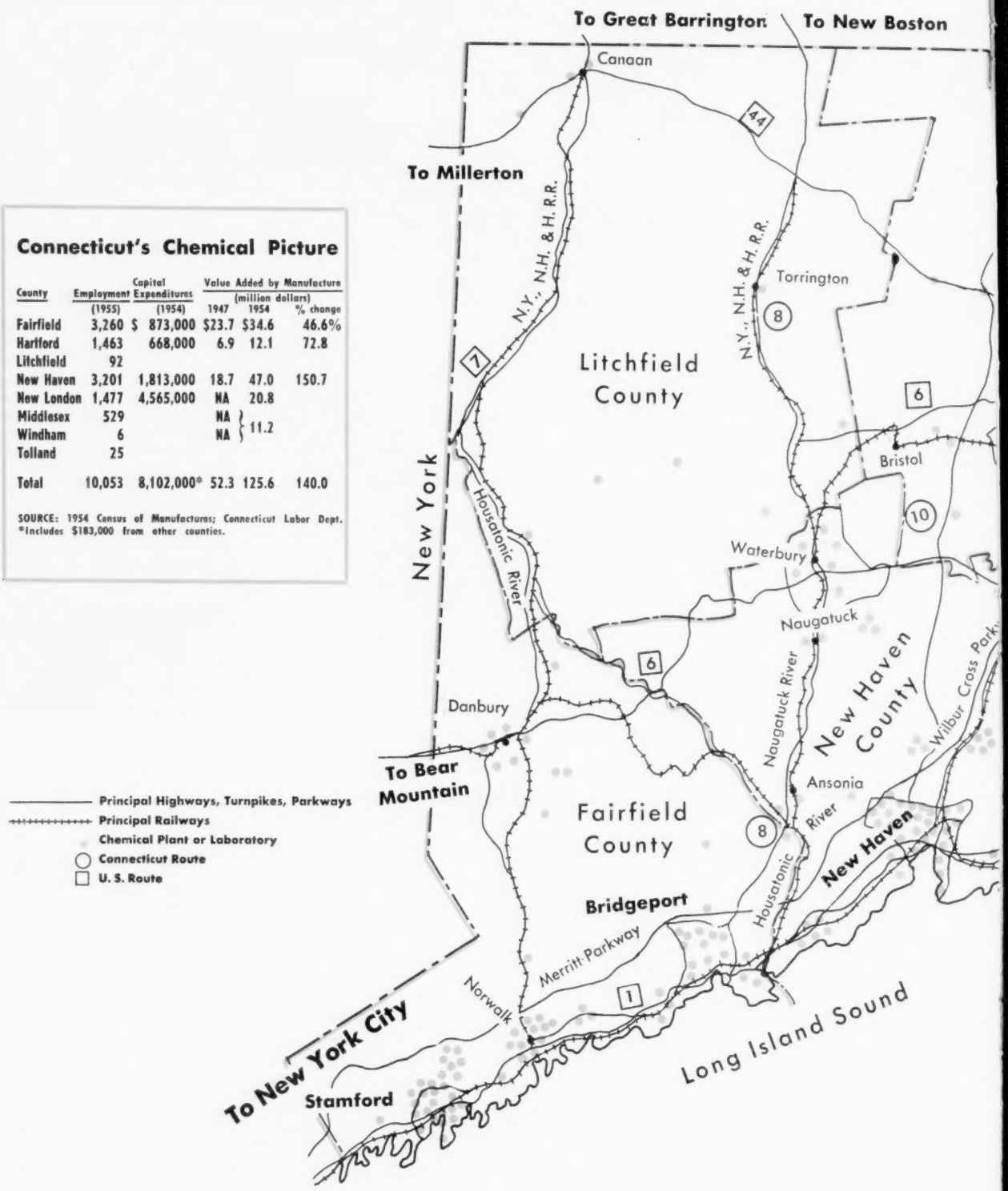
The state tends to draw firms that start with moderately priced raw materials and add a large margin of value in attaining finished, consumer products. The Connecticut state development commission reports that in '54 the value added by manufacture in chemicals was $9.06/man-hour, by far the highest value per man-hour of any of the state's industries. Typical of these high-margin companies are cosmetics and drug firms. In fact, of 215 chemical units (*see map, p. 40*), a total of 46, or 21.4%, include drugs and cosmetics in their output. The 22 paint product makers represent about 10.4% of the total.

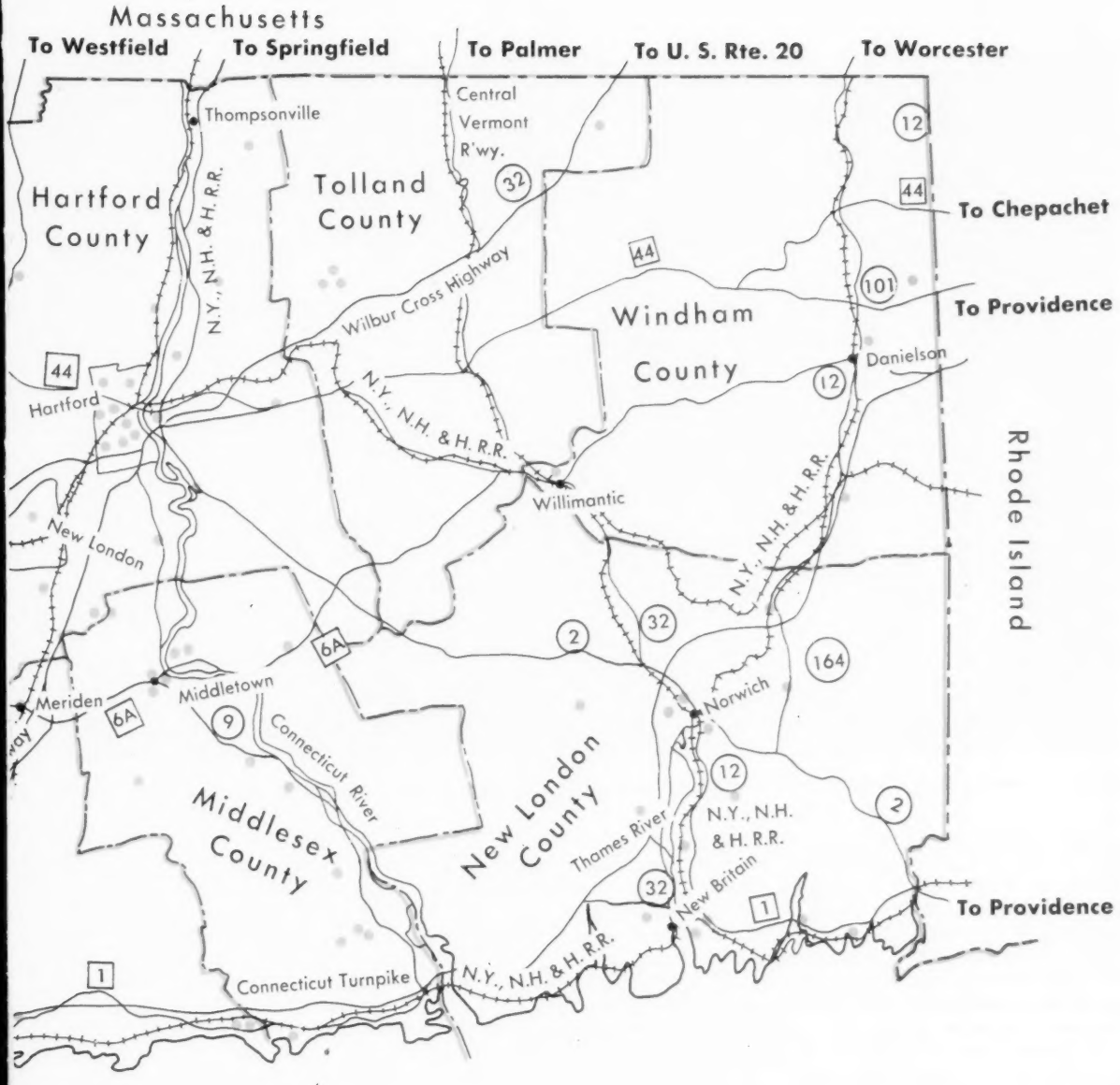
Attractive Features: The bulk of the state's chemical industries are clustered near the cities of New Haven,

Connecticut's Chemical Picture

County	Employment (1955)	Capital Expenditures (1954)	Value Added by Manufacture (million dollars) 1947	1954	% change
Fairfield	3,260	$ 873,000	$23.7	$34.6	46.6%
Hartford	1,463	668,000	6.9	12.1	72.8
Litchfield	92				
New Haven	3,201	1,813,000	18.7	47.0	150.7
New London	1,477	4,565,000	NA	20.8	
Middlesex	529		NA	11.2	
Windham	6		NA		
Tolland	25				
Total	10,053	8,102,000*	52.3	125.6	140.0

SOURCE: 1954 Census of Manufactures; Connecticut Labor Dept.
*Includes $183,000 from other counties.

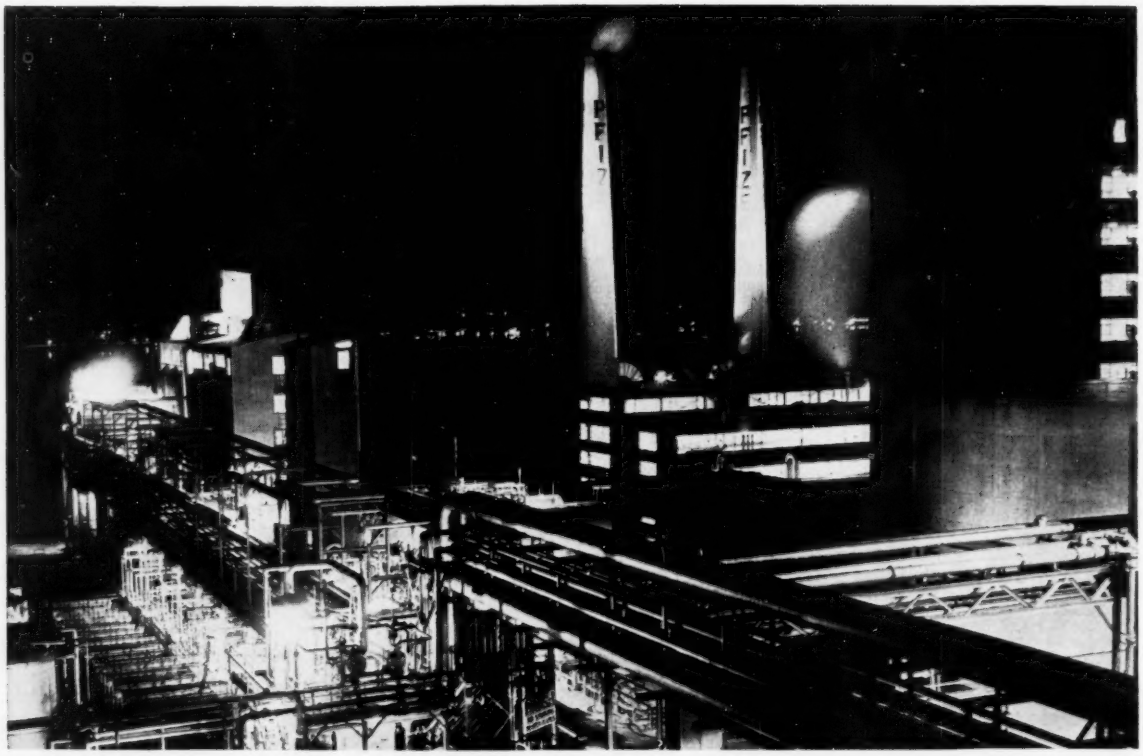




Bridgeport, Norwalk, Stamford and Hartford. These cities, in turn, are well served by both water and rail services; Connecticut has also one of the best highway systems in the U.S., has recently inaugurated service on most of its spanking-new Connecticut Turnpike.

Principal railroad facilities in the state are offered by the New York, New Haven & Hartford Railroad, which operates over 750 miles of track in Connecticut, provides connections with the major Eastern railroads. Highway connections are manifold, include the new turnpike, U. S. Rte. 1, U. S. Rte. 5, and the Wilbur Cross Highway.

Pharmaceutical Study: In a study made in mid-'56 portraying advantages of locating branch plants of pharmaceutical companies in the state, the development commission emphasized advantages in labor costs. At that time, it indicated that Connecticut earning rates for production workers in nonmetallic industry production was about 15% less than the $1.75/hour rate in the Midwest. More recent figures listed by the commission show that in Dec. '57 average hourly earnings of employees in the chemical and allied products field were $2.18, 9¢/hour more than those for all Connecticut industry.



Pfizer's Groton, Conn., pharmaceutical plant, one of the state's largest value-adding facilities.

Major Plants: Though many small firms in the state employ under 50 workers, a number of larger companies there have big payrolls. Among them is U. S. Rubber Co.'s Naugatuck Chemical Division, which makes rubber chemicals, synthetic rubber and organic and inorganic chemicals at Naugatuck. It employs some 1,400.

At Groton, Chas. Pfizer has one of its major pharmaceutical plants *(see photo, above)*, plans to build a 10,000-sq.-ft. research building. Also building is American Cyanamid, which is adding a 20,000-sq.-ft. wing to its plastic, resin and paper chemical plant at Wallingford; Cyanamid's research laboratory at Stamford employes more than 1,000 people.

At Montville, Olin Mathieson is building a $500,000 fuel elements plant for its Nuclear Fuels Division; and at New Haven it's putting up a $350,000 research center. A $1.2-million research center is being built at Wilton by Escambia Chemical Co.

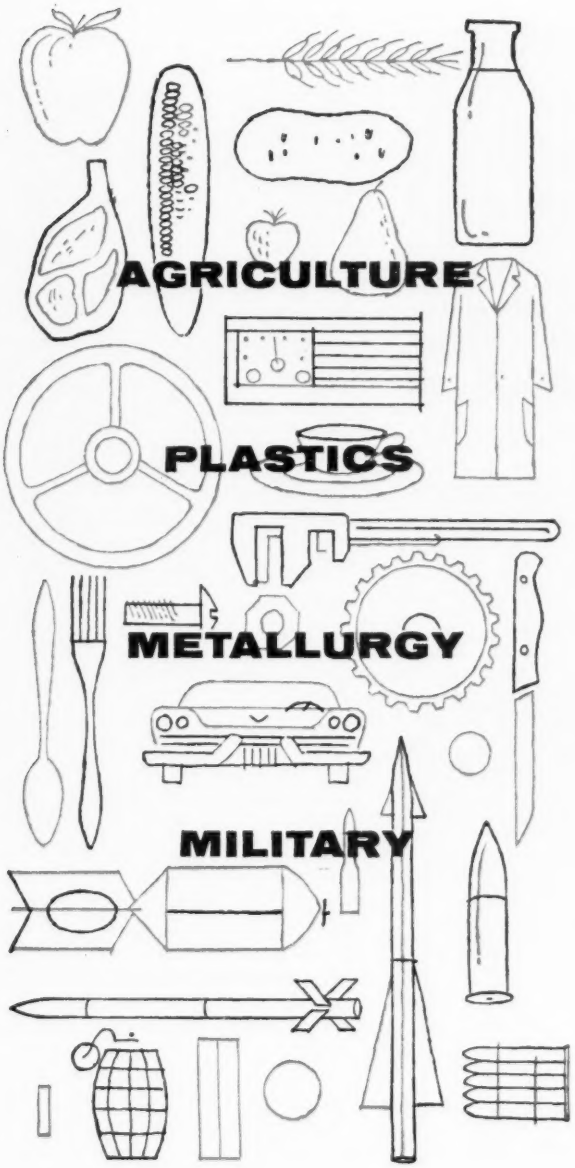
In addition to these new units, McKesson & Robbins' Bridgeport Laboratories Division turns out drugs, vitamins, pharmaceuticals and toiletries at Fairfield. Dow Chemical has a plant making plastics, granules and expanded polystyrene at Gales Ferry. Among other major firms in Connecticut: Chesebrough-Pond's, J. B. Williams, Virginia-Carolina, Clairol, Inc.

County Comparisons: Most concentrated city area is New Haven; but in chemical employment, Fairfield County led in '55, with 32.4% (5,265 employees) of the total—1,300 in industrial organic chemicals manufacture, nearly 700 in plants making drugs and medicines, the remainder in other chemicals manufacture. New Haven County accounted for 31.8% of total chemical employment: 2,900 in industrial organics, 330 in all others, and 12 in drugs and medicines. Next were Hartford and New London.

In terms of growth, however, New Haven County has far and away outdistanced the others. Taking the '54 Census of Manufactures figures as a base, the county increased its value-added figures—from $18.7 million in '47 to $47.0 million in '54, a growth of more than 150%. Hartford County increased 72.8%, to $12.1 million in '54, while Fairfield County grew 46.6%, to $34.6 million, over the same period.

Additional Factors: Connecticut development people like to cite other factors of interest to industries seeking locations there. They point out that Hartford, nearly dead-center in the state, is equidistant—about 100 miles—from two market and cultural centers, New York and Boston. Moreover, they point out, recreational facilities abound for employees both inland and on the coast.

Connecticut is mightily interested in attracting chemical industries within its borders. It recognizes its position as a location for high-value-added industry, emphasizes its advantages to these industries and the research field. Nearness to water, excellent transportation facilities, and an equable work force in terms of both availability and wage requirements should go a long way in attracting more chemical firms.



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ATLANTIC PETROLEUM CHEMICALS

ADMINISTRATION

OCAW's Schafer: New locals will be covered by the old contract.

LABOR

Coverall: Oil, Chemical & Atomic Workers International Union has won central bargaining in an agreement that will cover union employees of four locals of Corn Products Refining Co. at Pekin, Ill., Argo, Ill., North Kansas City, Mo., and Corpus Christi, Tex.

B. J. Schafer, international vice-president of OCAW, says the agreement—which runs to March 1, '60—provides that other units that may be organized will be included in its provisions.

The contract calls for all four units to receive an additional holiday, 8¢ and 14¢ hourly shift differentials, three weeks' vacation for 10 years' service and a broadened union security measure. The latter provision includes an "agency shop"; new employees not joining the union within 45 days pay the union a monthly service fee equal to union dues and maintenance of membership.

A special provision is included for employees in Texas, where union security clauses are illegal. The master contract provides for a new employee interviewing committee "to give new employees a better understanding of the good relationship between the union and the company."

•

Continued Exposure: The Workmen's Compensation Board of New York has ruled, in effect, that continued exposure to benzol can be con-

sidered a contributing factor to death. The ruling was made in the case of Joseph S. Friedman, who was a chemist in General Aniline & Film's Ansco laboratories at Binghamton, N.Y.

The board ordered that weekly payments be made to his widow on the grounds that his death in '56 was caused by benzol poisoning received in continued exposure to the chemical while working in the firm's laboratories. Immediate cause of his death was myeloid metaplasia.

•

Right to Work: Right-to-work legislation has again been introduced in the Kentucky state legislature, this time in the form of an amendment to the state's constitution. Previously proposed legislation has always been in the form of statutory bills; these have died in committee. Now, if the proposed amendment—which cannot be vetoed by the governor—passes by the required three-fifths majority, it will be presented for ratification on ballots at the next general elections.

LEGAL

Vanadium Trial Set: May 26 has been set as trial date for a civil suit in which Continental Ore Co. (New York) charges Union Carbide Corp. and Vanadium Corp. of America with violating antitrust laws in production and sale of vanadium.

Trial will be before Federal Judge George Harris in U.S. district court (San Francisco). In January, Judge Harris heard attorneys for the three companies in a pretrial conference.

Last year, after an 80-day trial, Carbide and Vanadium were cleared by a U.S. district court jury of price-fixing and conspiracy charges brought by the government (*CW, June 15, '57, p. 37*).

Continental is asking $1.5 million in treble damages, alleging that it was driven out of the vanadium business by the defendant companies in the '30s and early '40s.

•

Squibb's 'Fair Trade' Suit: While Congress considers a bill that would put "fair trading" in the federal realm (*CW, Feb. 22, p. 93*), suits against alleged violators of state "fair trade" laws go on. Latest litigation: E. R. Squibb & Sons has been granted permanent injunctions against 14 New York City retail concerns as a result

Squibb's Squibb: Pledging a program to enforce 'fair trade' prices.

of a suit charging violation of "fair trade" prices on various Squibb products.

Several of the injunctions involve Squibb products that had been repackaged out of large sizes and subsequently sold at below the unit package minimum "fair trade" price.

George S. Squibb, director of distribution for the New York pharmaceutical manufacturer, said the injunctions "are concrete evidence of Squibb's determination to assure observance of price levels authorized by federal and state statutes." He adds that the company will continue "its energetic program of enforcement."

IDEAS

Pharmacy Salute: Schering Corp. (Bloomfield, N.J.) has launched a program saluting pharmaceutical colleges in the U.S. and helping the institutions stimulate greater interest among their alumni. The program consists of four-page inserts appearing in nationally distributed pharmaceutical publications; it highlights a different college each month.

•

Effective Speaking: On March 17, American Management Assn. will open a new management course in effective speaking at the association's Academy of Advance Management at Saranac Lake, N.Y. Chief emphasis in the course will be on practice and drill sessions for the individual.

KEY CHANGES

Albert L. Rawlins, to assistant to the vice-president; and **Larry M. Wheeler,** to director of product development; Parke, Davis (Detroit).

C. M. Capka, to general sales manager, Despatch Oven Co. (Minneapolis, Minn.), industrial ovens and furnaces manufacturer.

S. V. Tuttas, to vice-president, Crown Cork & Seal Co. (Baltimore).

John L. Thompson, to director of planning control, Niagara Chemical Division (Middleport, N.Y.), Food Machinery and Chemical Corp.

Ralph S. Tyler, Jr., to director, Ferro Corp. (Cleveland).

Vernon Adrean, Jr., to assistant controller, Dewey & Almy Chemical Co. Division, W. R. Grace & Co.

Burton Schellenbach, to vice-president—sales, H. K. Porter Co. (New York).

Sevier Bonnie, Sr., to board chairman; **Robert P. Bonnie,** to president and treasurer; **R. M. Ladd,** to vice-president in charge of production; **R. R. Horine,** to secretary; all of Kentucky Color & Chemical Co. (Louisville).

Thomas H. Pike, Jr., and **John E. Chumbley,** to division vice-presidents; and **F. E. MacDonald,** to controller; Tube Turns, division of National Cylinder Gas Co. (Chicago).

Leland E. Spencer, to executive vice-president, Goodyear Tire & Rubber Co. of Canada, Ltd.

Sydney Steele, to director of public relations, Atlas Powder Co. (Wilmington, Del.).

Leo A. O'Hearn, to director of purchases and traffic, Callery Chemical Co. (Pittsburgh, Pa.).

John T. Mera, to controller, B. T. Babbitt (New York).

Donald O. Swan, to general manager, Petroleum Specialties Dept., Esso Standard Oil Co. (New York).

Warren P. Turner, to special assistant to the vice-president, High Energy Propellants Division, Olin Mathieson Chemical Corp. (New York).

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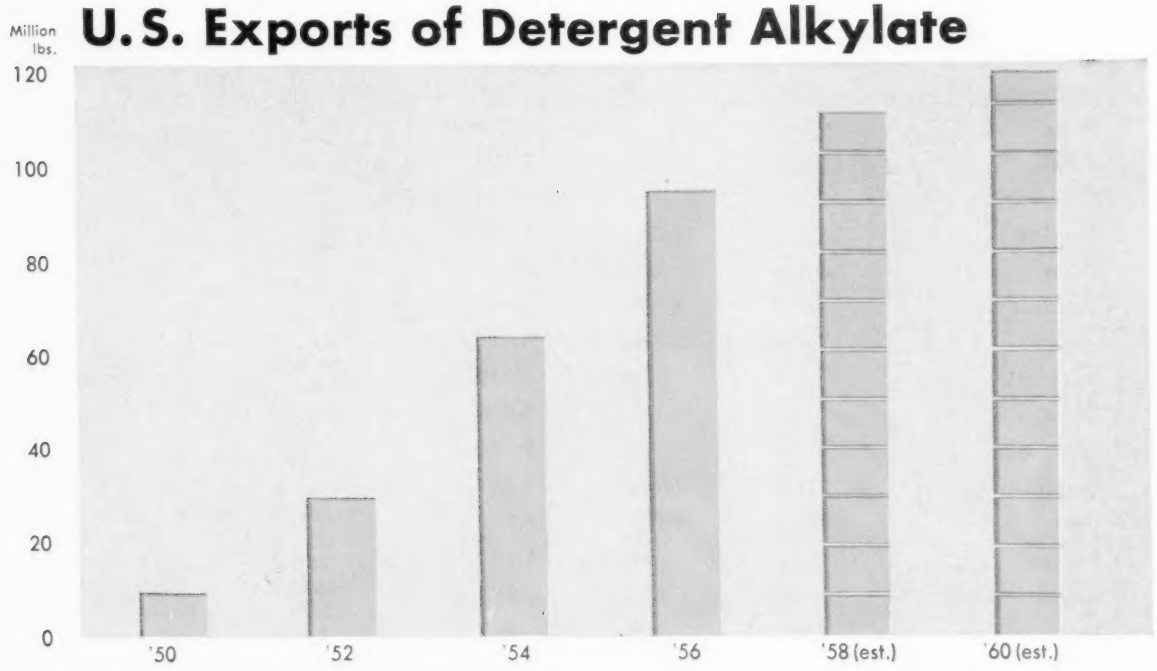

Alkylate Exports: Will the Boom Last?

An almost unnoticed CPI success story is that of the impressive growth of detergent alkylate exports. From a relatively small 10 million lbs. shipped overseas in 1950, annual exports have soared to more than 100 million lbs. in '57.* And enthusiastic marketers last week told CW that even allowing for a slowing growth rate, alkylate exports may well touch 120 million lbs./year by '60.

Only intensive development of new markets will make it possible to achieve these goals, however, in the face of such formidable obstacles as growing alkylate production in some overseas market areas. But U.S. exporters are confident they can meet this challenge.

Dodecyl Demand: To talk about detergent alkylate is, of course, to talk about dodecylbenzene. Hence, the steadily increasing foreign alkylate demand has not only been of direct benefit to producers of dodecylbenzene; it also has been good news for suppliers of benzene, the basic raw material. Taking note of predicted rising overseas demand, market experts in the petroleum industry now foresee these exports helping lift U.S. dodecylbenzene output to 575 million lbs./year by '65—which translates into a demand for some 43 million gal. a year of benzene.

Overseas Outlook: Dodecylbenzene producers are finding that overseas sales of detergent alkylate are providing an increasingly higher proportion of their total markets.

For example, in '52, U.S. marketers exported 30 million lbs. of detergent alkylate—slightly less than 10% of the total 307.2 million lbs. produced here that year. In '56, overseas shipments amounted to 94.7 million lbs. more than 20% of the 457 million lbs. produced.

And the prospects, say some, are excellent. One reason: the world market for detergents is still in its infancy and even the growing foreign production will not meet the total demand for some time.

Here's how the overseas detergent market shapes up:

Best estimate of current world consumption (U.S. included) of soaps and synthetic detergents is about 16 billion lbs./year. The U.S. total soap and syndet consumption is approximately 4.5 billion lbs./year.†

The rest of the world uses soaps and synthetic detergents at the rate of 11.5 billion lbs./year. It's obvious that the market potential for these materials is enormous—especially in light of fast-growing populations, stepped-up industrialization of many nations.

Foreign Switch Slower: The opportunity for syndets presented by this 11.5-billion-lbs. market is considerable because, so far, the shift from soap to synthetic detergent washing compounds has been much slower in foreign countries than in the U.S. The reasons are largely economic; besides, there's traditional hesitancy among housewives to change established practices. As a result, although synthetics now make up 70% of the washing compounds marketed in the U.S., they comprise only 30% of the total market in foreign countries.

Total foreign output and demand

*Estimated on basis of official export data (U.S. Dept. of Commerce) totaling 94,580,483 lbs. for 11 months of '57.

†Incidentally, this might suggest that U.S. *per-capita* consumption would be the highest. Not so. Belgium comes first with a 28.3-lbs. *per-capita* consumption—the U.S., 27 lbs.

Foreign Markets for Detergent Alkylate

(Thousand pounds)

Country	1954	1955	1956
Italy	7,911	11,155	20,358
Belgium	10,177	7,372	16,591
Canada	6,900	13,492	14,444
Mexico	13,653	18,289	9,041
Cuba	4,628	7,025	7,027
Venezuela	3,127	5,392	5,879
Japan	1,480	3,482	5,496
Denmark	0	0	4,010
Sweden	451	4,020	3,067
West Germany	31	0	1,895
South Africa	1,005	1,298	1,867
Israel	1,024	2,096	1,743
France	2,328	66	1,103
Brazil	490	477	683
Taiwan	129	232	425
Greece	67	178	363
Peru	0	73	238
United Kingdom	4,999	10,897	112
Finland	68	134	64
Chile	84	22	55
Yugoslavia	0	0	40
French Morocco	0	2	16
Colombia	2	39	15
Turkey	0	136	8
Netherlands	4,109	1,559	1

for finished synthetic detergents, according to one industry estimate, was about 2.5 billion lbs. in 1953-54

Fight Among Five: Five U.S. firms are in line to supply the export needs. Top producer is Oronite Chemical. Other major U.S. producers supplying foreign countries are Monsanto, Continental Oil, Standard Oil of Indiana, and Atlantic Refining.

Oronite was the first producer to tap the export market, began shipping its product (Alkane) to the United Kingdom shortly after World War II. By '50, it had expanded its markets to include Mexico, Cuba, Venezuela, Canada, Italy, Japan and the Netherlands; today, it sells to hundreds of sulfonators located in 27 countries.

In recent years, Oronite—which holds basic patents—has entered into joint ventures with foreign partners in those areas where the lack of dollars prevents alkylate imports from the U.S. First of these plants to go onstream was that of Grange Chemicals (Scotland), owned jointly by Oronite and British Hydrocarbon Chemicals. A second plant is due onstream early in '58 at LeHavre, France. It will be operated by Petrosynthese for Oronite and two other companies—Compagnie Francaise de Raffinage and Soc. Atlantique Progil Electrochimie.

Foreign Competition: Biggest headache for U.S. marketers of detergent alkylate that ship abroad is the problem of developing new markets to replace those lost when foreign alkylate manufacturing plants spring up in established marketing areas (provided they haven't an interest in the plants). So far, the lack of technological developments in many foreign countries —despite increasing worldwide demand for products based on detergent alkylate—has made the search for new outlets rewarding for U.S. producers.

But more foreign plants are under construction. Estimated total production of detergent alkylate by all foreign plants (excluding those in Russia and its satellites) is expected to increase from the current 300 million lbs./year to nearly 400 million lbs. by the end of this year.

More in Sight: Canada has already entered the picture with two new plants (Imperial Oil and Shell*) slated for full production in '58. And Japan has indicated it will include detergent alkylate in its near-future manufacturing plans.

Other foreign alkylate plants already built or now under construction, with estimated production capacities ranging from 10-50 million lbs./year, are those by Shell, Monsanto and Grange Chemicals, in England; Esso-Standard, Petrosynthese and Shell, in France; Società Italiene Resine and Edison, in Italy; Chemische Werke Hüls, Rheinpreussen and Harpener Bergbau, in Germany; Shell, in Curacao.

Over the long range, as foreign use of syndets continues to climb toward the same dominance as that in the U.S. (70% of the total detergent market), the total foreign market for these materials could reach an estimated 12-14 billion lbs./year.

The increasing number of foreign detergent alkylate makers has caused a few observers in the U.S. to envision a decline in U.S. exports of the syndet raw material (*CW, Feb. 8, p. 29*). But the decline hasn't started yet, though the rate of growth is slackening somewhat.

Counterbalancing this pessimistic view is that of those close to the export business. They believe the export markets won't peter out for a long time —provided new world markets are actively sought and developed.

*Reference to Shell hereafter refers to Royal Dutch-Shell group.

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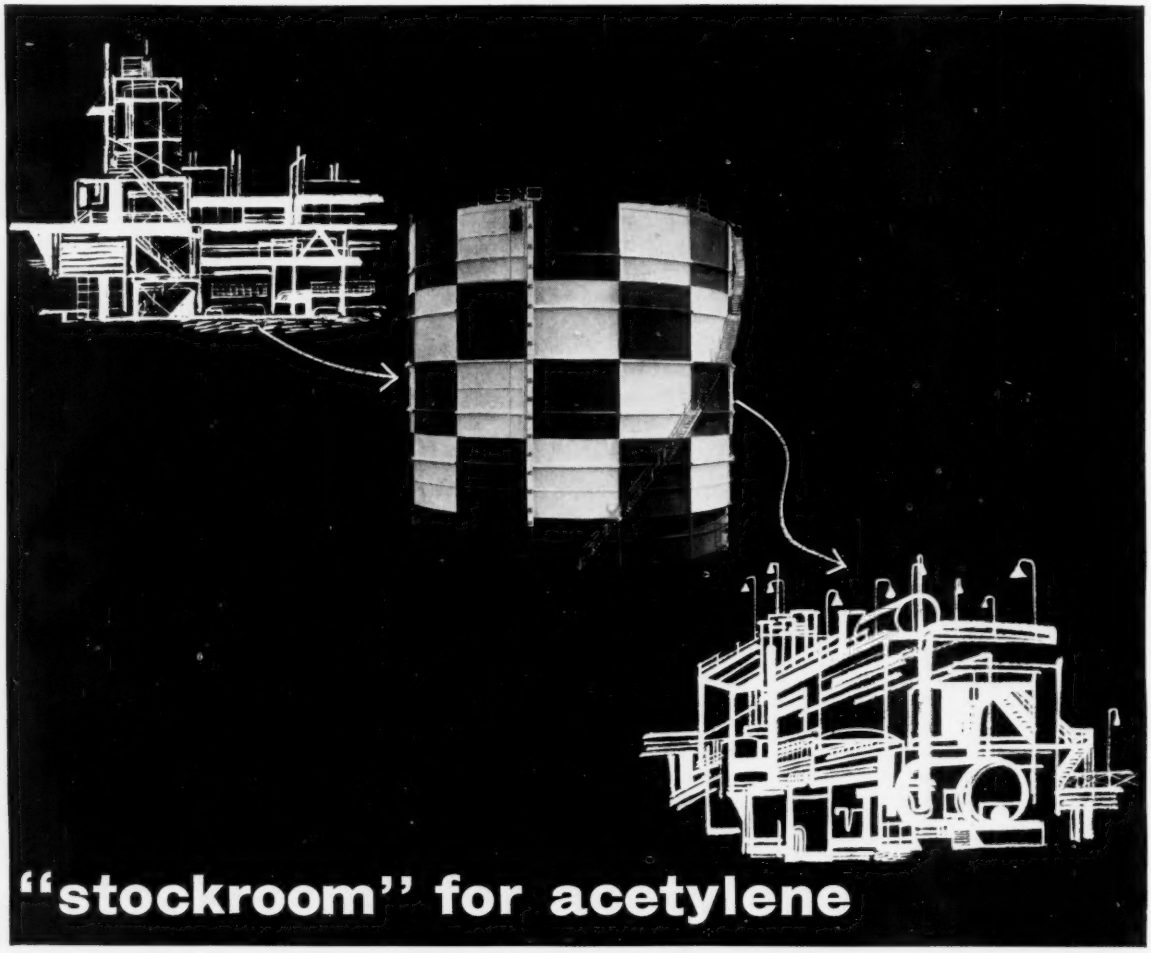

Linde Company* purchases Wiggins Gasholder for storage of acetylene between production and use cycles

Ever since the Linde Company's new acetylene plant in Montague, Michigan went "on stream", a new 100,000-cubic-foot Wiggins Gasholder has played a vital role in the operation. Every cubic foot of acetylene produced passes through the "stockroom" on its way to DuPont for use in the production of Neoprene. The gasholder provides acetylene storage and serves as surge capacity to enable Linde to satisfy both normal and emergency requirements.

If you produce, store or use gases, investigate the advantages of Wiggins Gasholders. They can be built to any capacity—from 50-cubic-feet to a million. Call or write General American for complete information.

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Offices in Principal Cities

Design Supervisor Trout (standing) and Peerless Pump engineers take long-range approach as . . .

New Group Primes for Basic Pump Studies

The engineers shown above are part of a pioneering project under way at Food Machinery and Chemical Corp.'s Peerless Pump Division (Los Angeles). They're members of a new engineering group formed solely for long-range investigations.

And, although pump research is not new, this group is believed to be the first one to be completely divorced from familiar day-to-day engineering problems. Its 17 members are free to roam exclusively in the realm of the future. Aim: to advance pump technology, generally, as well as move Peerless into new pump fields, improve its standard products. The chemical process industries — which spend more than $50 million/year on new pumps—is sure to watch this group's activities with keen interest.

Nuclear Outgrowth: The new group is an extension of what proved to be a highly successful experiment begun by Peerless in mid-'56. A nuclear-process section, which was set completely apart from production or works engineering, steered Peerless into the nuclear pump field, also extended the firm's interest in chemical pumps.

Until the nuclear-process section was formed, new-product development was handled by the engineering departments of the three main Peerless plants—at Los Angeles, Chicago and Indianapolis. This worked fine in the company's early stages, when Peerless operated almost exclusively in the agricultural field. Since World War II, the company has expanded—by acquisition* and modification of existing lines—into chemical and refinery pumps. But the plant engineering departments were involved with all the day-to-day problems of getting products out, could go only so far with development work. There was little chance for basic research.

The decision to break into the nuclear field called for a new kind of effort, which Peerless hopes will set the pattern for the future.

As a result of the nuclear-process section's efforts, Peerless, as a subcontractor, is supplying pump ends for main-reactor circulating pumps of nuclear-powered submarines, as well as complete pumps and motors, and also pump ends for nuclear power stations.

In addition, the group developed a line of refinery hot-oil pumps—a high-pressure, high-temperature, heavy-duty line made to API specifications. And it came up with a complete line of general-purpose pumps for the chemical process field; these models feature standardized frame sizes with interchangeable components. This suits the pumps to a broad range of applications, simplifies the problem of stocking replacement parts.

Building on Three: When the new division engineering section was formed, it was divided into three main groups. The extant nuclear-process section became the largest group; its seven members will continue to work in the nuclear field. A three-member process group will attempt to add to the chemical-process pump line. And a two-man group ranges all of the firm's present pump models, is responsible for improving designs.

This latter group, for example, is now studying techniques for developing lighter-weight, higher-speed, smaller pumps that have improved cavita-

*For example, Dayton-Dowd's acquisition brought Peerless into waterworks and some chemical pump lines; Chicago Pump brought it into pumps for the building trades.

tion characteristics (the partial vacuum in the liquid at the impeller entrance that produces the suction).

A proposal group acts as a service group to the others, works with prospective customers. This group determines estimated costs of pumps proposed by the prospective customer or one of the three engineering groups, also estimates the performance characteristics of the pumps proposed.

To bring a fresh approach to specific problems under study in each of the groups, a so-called "development engineer" covers the entire field. He also has the function of "brainstorming"—suggesting ideas.

Heading the new department is division chief engineer, Dan Rankin, an 18-year man with Peerless, and design supervisor, Robert Trout, who was Rankin's assistant at the Los Angeles plant.

Still Divorced: Projects may be initiated from within the groups, from top management or from sales. They will be carried through to the point at which they become a part of regular production. And, if a totally new line of pumps is developed, some of the men who have had a hand in the development will be transferred to production along with the product.

Among the projects already under investigation are pumps for phases of nuclear-fuel-element reprocessing, plutonium production, uranium-ore reduction and exotic fuel handling (particularly liquid oxygen and hydrogen peroxide, both at ground-transfer loading points and within chemical plants).

Both Rankin and Trout point out that work on specific design studies will not reduce emphasis on basic technical probes into the whys and wherefores of general pump performance.

Some pump manufacturers have been contributing to this basic knowledge for several years. For example, Worthington Corp. (Harrison, N.J.) has had a noise and vibration team doing research on many lines of its process equipment for about 10 years. These studies have led to improved designs for rotary pumps and pump motors and preferred piping layouts for centrifugal-pump installations. Peerless, with its new division engineering section devoting full time to pump studies, should add to this store of fundamental information.

EQUIPMENT

Wrought Iron: There's a new entrant in the ranks of wrought iron. It's called 4-D wrought iron, is produced by A. M. Byers Co. (Pittsburgh). The firm claims 4-D has an improved corrosion resistance, greater uniformity and improved physical and mechanical properties. The metal's oxygen content is said to be lower and phosphorus content higher than Byers' regular wrought iron. The firm adds that iron silicate fibers—the part of wrought iron said to halt corrosion—have a higher silicate content.

•

High-Temperature Tubing: Superior Tube Co. (Norristown, Pa.) is now offering small diameters of "superalloy" tubing, which is touted for its high strength properties at high temperatures. The line includes 16 different alloys with iron, nickel, cobalt and cobalt-chromium-nickel bases for service with stress loads to 25,000 lbs. per sq. in. and temperatures to 1200 F. Seamless, and welded and drawn tubing 0.012 to 1.125 in. in outer diameter are available.

•

Tote-Bin Filling Adaptor: Tote System (Beatrice, Neb.) now offers as standard accessory equipment an adaptor that fits into any of the five standard sizes of Tote Bins. It may be attached to process filling equipment or conveyor. The adaptor is a metal collar with a tapered rubber gasket that fits into the Tote Bin, and a nylon sleeve that attaches to process equipment. The adaptor may also be used for specially fabricated Tote Bins.

•

Mercury-Vapor Lamp Fixture: Crouse-Hinds Co. (Syracuse, N.Y.) offers a new explosionproof fixture, Type EVA, for mercury-vapor lamps. It is suitable for high bays, is said to increase lamp life, give more lumens per watt. It takes 250-watt Type BT-28 and 400-watt Type BT-37 mercury-vapor lamps.

•

Plastic Pipe: Amercoat Corp. (South Gate, Calif.) is offering a new, glass-fiber-reinforced epoxy plastic pipe. The corrosion-resistant, nonflammable pipe is suggested for many corrosive solutions, petroleum hydrocarbons and solvents. Bondstrand 250 has a nominal working pressure of 250 psi.; Bondstrand 500, a 500-psi. working pressure. Pipe with higher working pressures are available. The new pipe comes in 2- to 12-in. diameters in 20-ft. lengths with plain, bell-and-spigot or flanged ends. Diameters up to 40 in. are available.

•

Plastic Venturi Nozzle: A plastic Venturi flow nozzle of fiber glass-reinforced polyester, designed for easy insertion between pipe flanges in a process line, is a new product of B-I-F Industries, Inc. (Providence, R.I.). Called Model NZRP, the nozzle is suggested for use with nonoxidizing acids, corrosive salts and weak alkalis, some alcohols, formaldehyde, refinery crudes and gasoline. Sizes: 2 to 24 in. for pressures to 150 psig. and temperatures to 250 F.

•

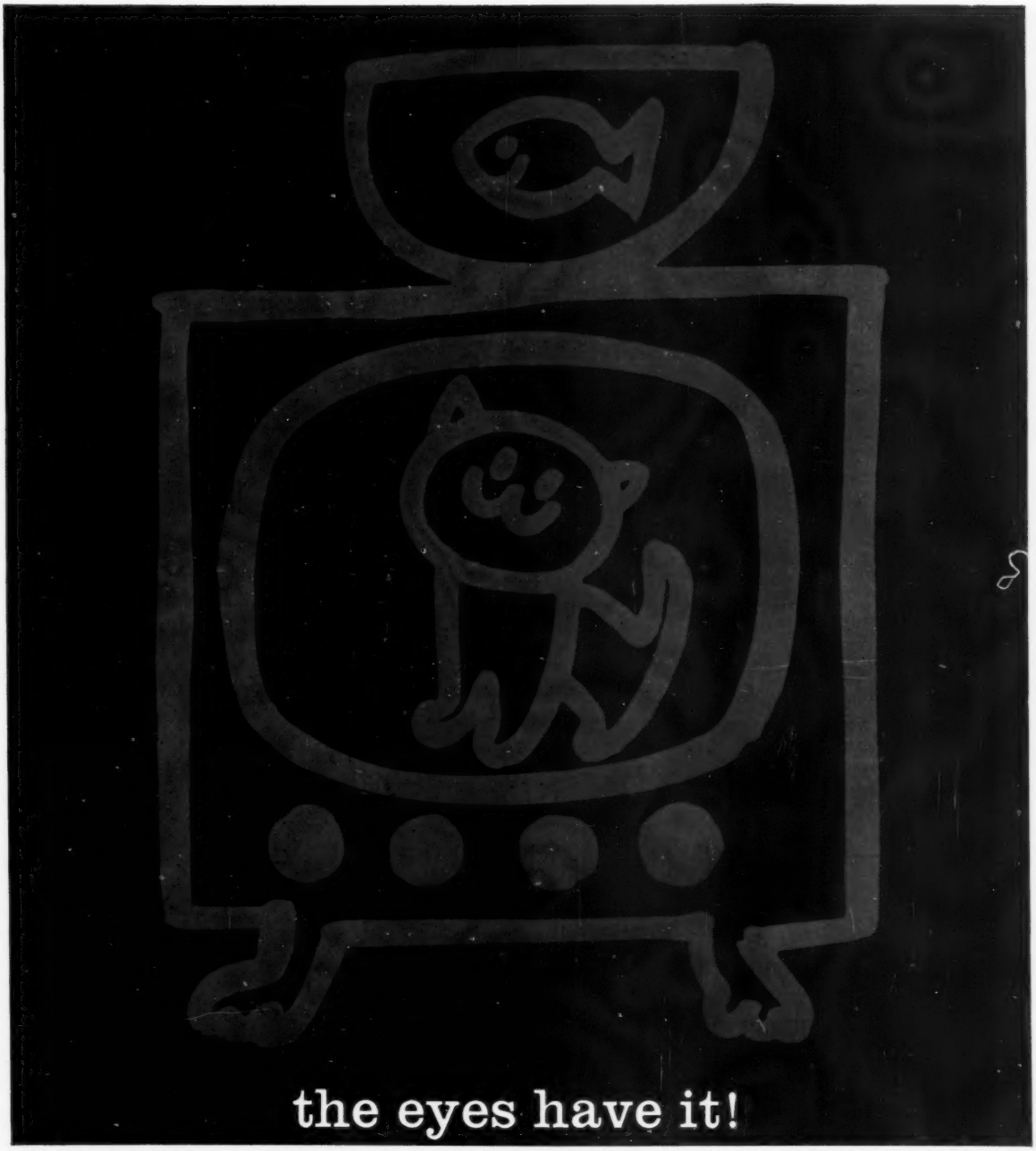
Nylon Filter Fabrics: Nitex, a line of more than 200 different nylon filter fabrics from Switzerland, is available from Technical Fabricators, Inc. (Nutley, N.J.). The fabrics may be used for filtering wet or dry particles 25 to 3,000 microns in size, are particularly designed for filter cakes that are difficult to release. Nitex has a tensile strength of about 200,000 psi., has high abrasion resistance, will withstand temperatures to 250 F.

•

Micromesh Screens: Buckbee Mears Co. (St. Paul, Minn.) is out with a line of fine-mesh screens and sieves with uniform apertures of 20 to 90 microns. The screens, with tolerances held to ± 2 microns, are used for particle-size measurement and control. Screens are now being used to check particle size of petroleum cracking catalysts, are currently being tested by API and ASTM, says the firm.

•

Heat-Exchanger Tube: Union Carbide Corp.'s National Carbon Co. Division (New York) is offering a new Karbate heat-exchanger tube. It is an impervious graphite tube with low fins for Karbate shell and tube heat exchangers. The $\frac{7}{8}$-in. ID tube has 23 fins (each $\frac{3}{16}$ in. high), which increase the inner tube surface to 2.6 times that of a plain tube. The fins twist helically through the tube, increase the heat transfer coefficient as fluid velocity increases. Tubes provide greater capacity than plain tubes in a heat exchanger without changing the flow plan. Tube lengths available: 6, 9, 12, 14 and 16 ft.



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Technology
Newsletter

CHEMICAL WEEK
March 1, 1958

Boron fuels and the chemical bomber continue to stir up interest for chemical process firms:

• At the Society of Mining Engineers meeting in New York City, last week, D. R. Gibbons of Arthur D. Little estimated the scope of the government's program to develop boron fuels. He put the total capacity of the two prototype plants now being built (the Air Force plant by Olin Mathieson and the Navy plant by Callery) at 3,400 tons/year. He estimates that OM's plant—using a lithium reduction—will need about 200-250 tons of lithium metal to start up. Because most of the metal will presumably be recovered and recycled, he puts the annual consumption at 20 tons/year after the first year.

This capacity is somewhat higher than *CW*'s earlier estimate of 2¼ million lbs./year for OM's plant (*CW, July 20, '57, p. 38*). His conclusion is the same: Total annual production from these plants would be enough to keep a bomber aloft only 140 hours. But Gibbons feels that the planes will use the boron fuels for only a portion of their flying time (approximately 25%), at least initially.

• Meanwhile, more information is available on the timetable for the chemical bomber (North American's WS-110 A). According to *Aviation Week*, it is scheduled to fly for the first time in 1962, become operational in '63. The magazine also sees supersonic transports by '70 that will probably use versions of General Electric's X-279, the engine for WS-110A.

•

Nuclear propulsion of rockets got a boost last week, too. Rocketdyne revealed some of its work in that field under Air Force contract. It's working on nuclear energy as a means of heating a gas (working fluid) to give the rocket its push. Although it did not state what gases it was considering, ammonia, hydrogen and helium have been mentioned as possibilities for the job.

•

An attempt to get alumina from low-grade ores and coal mine wastes will be made by Strategic Materials Corp. (Buffalo) and North American Coal Corp. (Cleveland). The two have formed a new company, Strategic North American Corp., to exploit an acid leach developed by Marvin Udy and his son, Murray Udy. Research and pilot operations will be carried out at Strategic's laboratories in Niagara Falls.

High costs and poor-quality products have been attending previous efforts to adapt an acid leach for this job. But Strategic says it has worked up some cost-cutting wrinkles and has produced a lab-scale, high-grade alumina from coal mine wastes. If the process lives up to expectations, the new firm will put up a commercial installation at North American's Powhatan Mines on the Ohio River.

North American, the ninth largest commercial coal company, has extensive reserves throughout the Ohio River valley, wants to put its waste piles to work. Strategic has had a continuing interest in new metals processes. It's working with Koppers in developing engineering and economic data for commercial installations (*CW Technology Newsletter, Oct. 21, '57*). And an affiliate is operating a prototype plant using the Udy-developed method of making ferromanganese from low-grade ore (*CW, Feb. 9, '57, p. 40*).

•

A new bleach is being introduced by Du Pont this week. Named Oxone, a monopersulfate compound, it's said to be suitable for formulation of heavy-duty household products for cotton and more delicate fabrics. It will likely be used in products competitive with sodium perborate (light duty) and chlorine-containing (heavy duty) bleaches. Cleansers are also looked on as a likely market for it.

Du Pont feels that Oxone, unlike liquid hypochlorite and other chlorine-containing bleaches, will not damage fabrics nor weaken garment threads. It's making limited quantities in a pilot plant in Niagara Falls, N. Y., will put up a large-scale unit at Memphis.

•

Insects may be the best bet for controlling tough weeds such as poison oak, dwarf mistletoe, thistles and possibly some of the more obnoxious lawn and garden weeds. That's the conclusion arrived at by J. K. Holloway, of the University of California and the U.S. Dept. of Agriculture, and C. B. Huffaker, University of California entomologist.

The once-dreaded Klamath weed in California has already fallen prey to controlled distribution of certain insects. And the state is trying a similar approach to wipe out gorse, a shrub that infests coastal counties north of Santa Cruz. USDA in cooperation with the University of California is exploring the potentialities of weed control by insects in a number of other projects.

•

It may be possible to grow meatier pigs by adding a reducing compound to their normal feed. Iowa State College researchers have found that pigs taking small amounts of 3-nitro (3-nitro 4 hydroxy-phenyl arsonic acid) showed less backfat than would be expected. (Backfat is an important index of percentage of lean cuts of pork obtainable from a pig.) The compound is related to dinitro phenol, a chemical once recommended for human weight-reducing programs. Preliminary tests indicate the 3-nitro favors red-meat production at the expense of fat in pigs. This effect was uncovered during an investigation of arsenicals as feed additives (*CW, Oct. 6, '51, p. 16*).

•

The Russians are working on polypropylene too. A recent article in *Moscow News* reports the synthetic fiber institute in Moscow is spinning polypropylene filaments.

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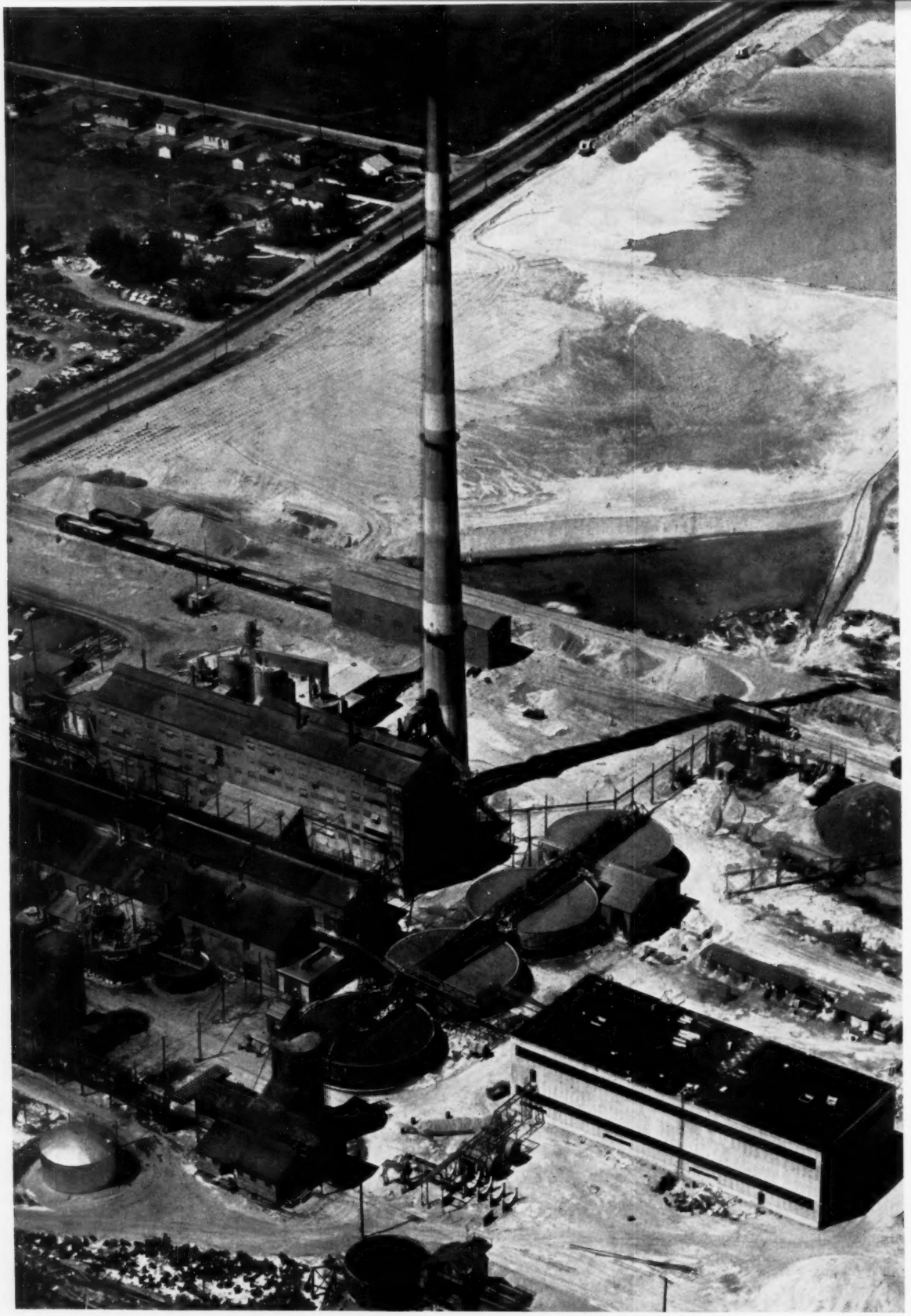


Vitro's new $1.2-million solvent-extraction plant (lower right) cuts cost, boosts yield of uranium.

Acid-leaching of uranium ores is checked to assure uniformity of feedstock to extraction plant.

Switch to Solvent Hikes Uranium Recovery

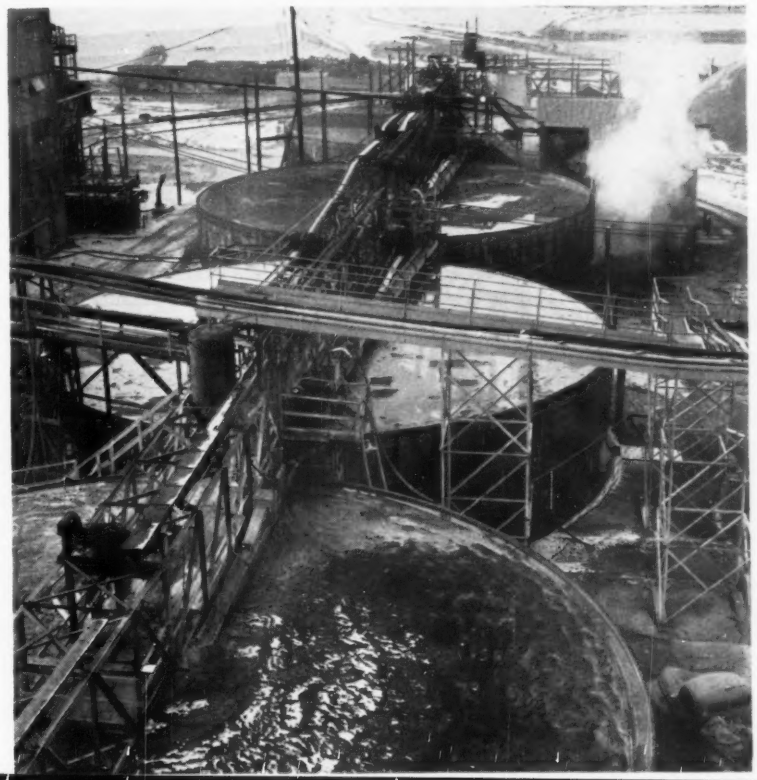
Vitro Uranium Co. has had only a few months to try its new 660-tons/-day solvent extraction uranium recovery plant in Salt Lake City, which it put in late last year in place of a 500-tons/day phosphate precipitation unit. But already it can report that it is getting all the hoped-for savings.

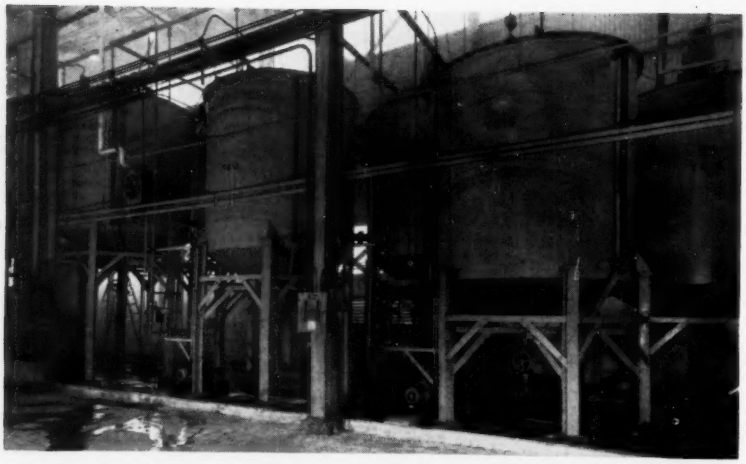
And lab-scale tests indicate that the method may afford further cost reductions by permitting solvent extraction of slurries in the same equipment employed for liquor extraction.

Reagent Savings: W. B. Hall, president of Vitro Uranium, says that the solvent extraction system used at the Salt Lake City plant compares favorably with the ion-exchange processes employed by other domestic uranium processors. But most of his direct-comparison studies, of course, have been between the new unit and the precipitation unit it replaces.

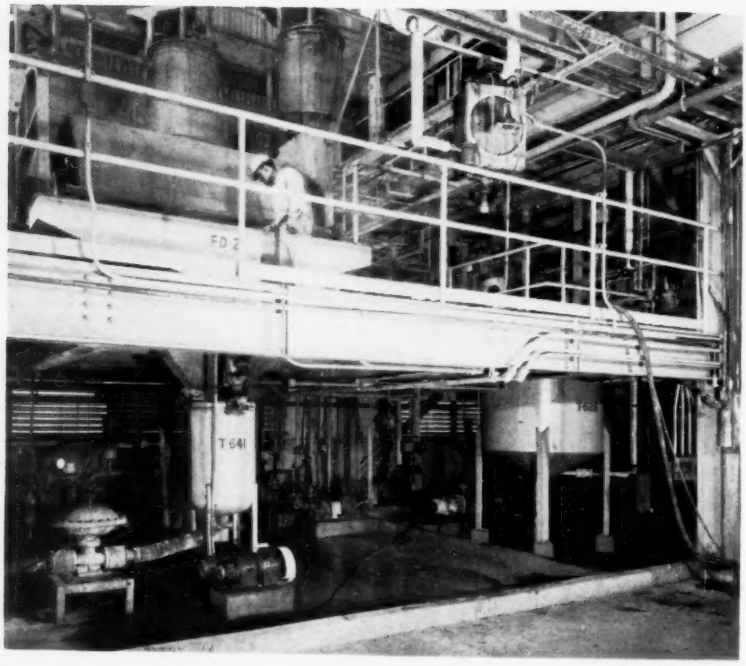
The biggest advantage of solvent extraction over the former phosphate

Washer-thickeners remove solids from uranium-rich leach liquor.





Solvent is stripped of uranium by HCl in group of mixer-settlers.



Uranium from HCl evaporators is precipitated with ammonia.

precipitation process, says Hall, is the saving it provides in reagent costs. The plant uses dodecyl phosphoric acid (for extraction) and hydrochloric acid (for stripping uranium from the solvent)—both of which are almost completely recovered for recycle.

The second-largest saving realized in the new plant comes from the high degree of automation possible with solvent extraction. And the third important saving is derived from the much higher uranium recovery efficiency of the new method. It's also important to note, Hall adds, that solvent extraction provides greater flexibility, therefore permits treatment of a still wider variety of uranium ores.

Multiple Sources: The principal ores treated by Vitro are uraninite, autunite and carnotite. As received from major mining centers in Utah, Colorado and Wyoming, however, these ores range from refractory sandstone and limestone materials to clay-bearing and easily slimed ores. Vitro's first steps: segregation of ores according to ease of treatment; blending of similar types of ore to provide a feedstock of uniform uranium content (0.25-0.30% U_3O_8).

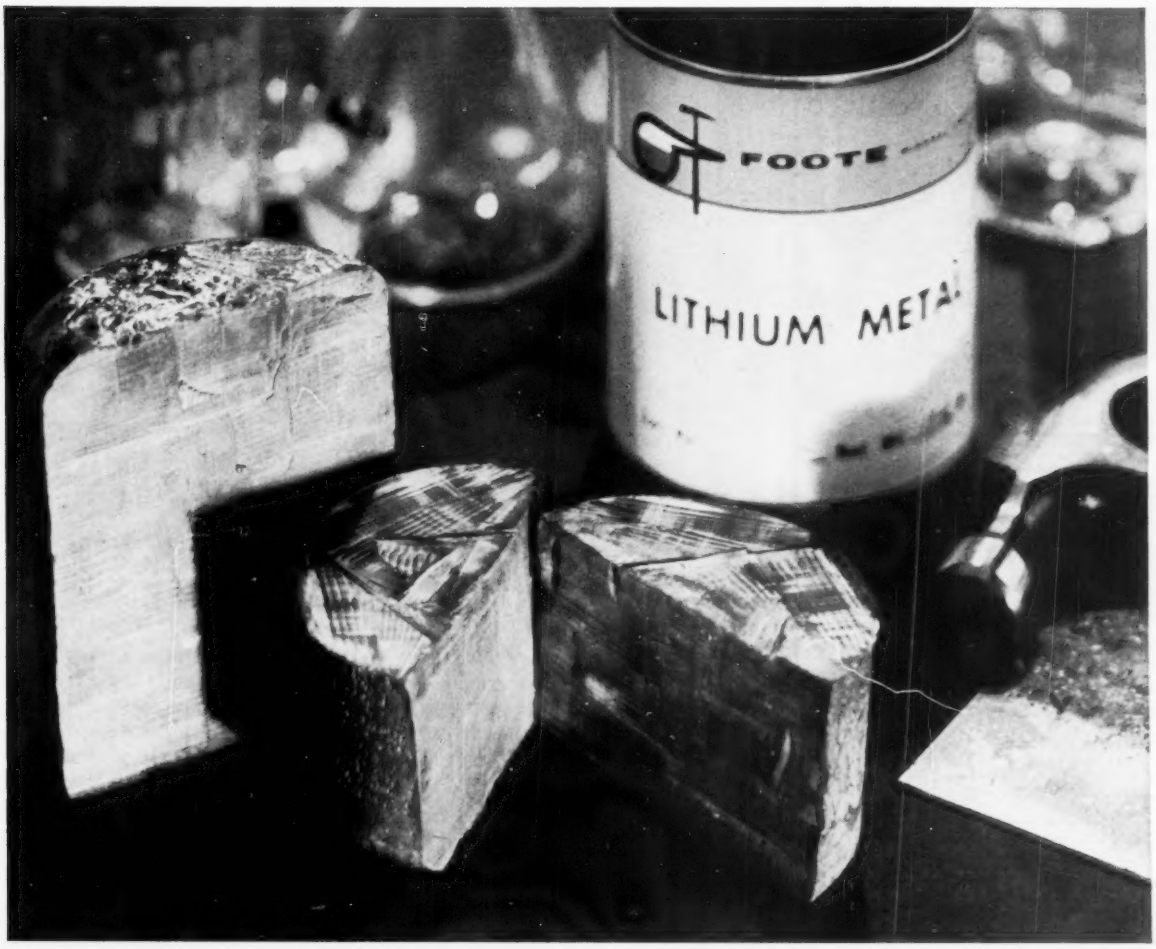
After they have been ground to the required size (−20 mesh for amenable ores; −28 mesh for the hard-to-process materials), the blended ores are charged to a series of 13,000-gal. acid-resistant leaching tanks. Difficult ores are fed into the first tank, simpler ones are introduced further along the leach line. Sulfuric acid and sodium chlorate are put into the leaching system at both points of ore feed. Flake sodium sulfide is added in the last leach tank to reduce ferric iron and to precipitate some of heavy metals. Gangue and heavy-metal sulfides are then removed in four 70-ft.-diameter washer-thickeners, which yield a clear pregnant feed liquor for the solvent extraction plant.

Solvent Operations: Because dodecyl phosphoric acid (DDPA) isn't commercially available, Vitro makes its own from phosphorus pentoxide (P_2O_5) and dodecyl alcohol (2, 6, 8-trimethyl nonanol-4). The solvent manufacturing process is completely instrumented for automatic control, yields DDPA diluted to 0.1 molar with kerosene. The kerosene serves the dual purpose of absorbing heat in the solvent-forming reaction and acting as a carrier for the solvent in the extraction cycle.

Vitro's choice of solvents was based on a combination of advantageous properties. Among DDPA's qualifications are:

- Low first cost for solvent.
- Low solubility of solvent in the aqueous phase.
- High concentration ratios.
- Low over-all chemical costs.
- Promise of adaptibility to solvent extraction of slurries.

Recovery of uranium from the leach liquor takes place in a four-stage countercurrent extraction system. The liquor is supplied at a feed ratio of 6:1 (aqueous:organic) through turbomixers that provide intimate contact of the aqueous phase with the continuous organic phase. Feed stream is measured and controlled automatically; interface sensing elements actuate control valves on extractor underflow lines to maintain proper phase separation in each unit. Solvent is used at 0.1 M to provide highest selectivity to UO_2 ion, minimum extraction of ferric ion, thorium and titanium.



Lithium is the alkali metal with the most-*est*

Atomic weight, light*est* . . . ionic radius, small*est* . . . specific gravity, low*est* . . . bonding energy, strong*est* . . . heat capacity, high*est* . . . heat of vaporization, great*est* . . . reaction with water, slow*est* . . . reaction with hydrogen, fast*est* . . . liquid range, wid*est*.

That's a good bit of the lithium metal story right there! But it's not all. The part that should interest you most is the many present and future uses of lithium's *est's* in the chemical industry.

As the alkali metal with the widest liquid range, lithium shows great promise as a super heat transfer agent. Lithium also has the necessary high heat capacity and good thermal conductivity.

In the polymerization of olefins, lithium metal is showing unique catalytic properties distinct from that of the other alkali metals, especially in the polymerization of isoprene to natural-type rubber.

Organolithium compounds made from lithium metal are used as alkylating agents in Grignard-type reactions.

Lithium metal is also used to prepare lithium hydride which in turn is used in synthesizing simple and complex hydrides. Presumably, it is the very slight solubility of the lithium hydride above that of the other alkali hydrides that makes lithium hydride so useful.

It stands to reason . . . if you're looking for the most-*est* in an alkali metal, you should investigate lithium . . . you should read our Bulletin 101 *Lithium Metal*. For your copy, write Technical Literature Dept., Foote Mineral Company, 420 Eighteen West Chelten Building, Philadelphia 44, Pennsylvania.

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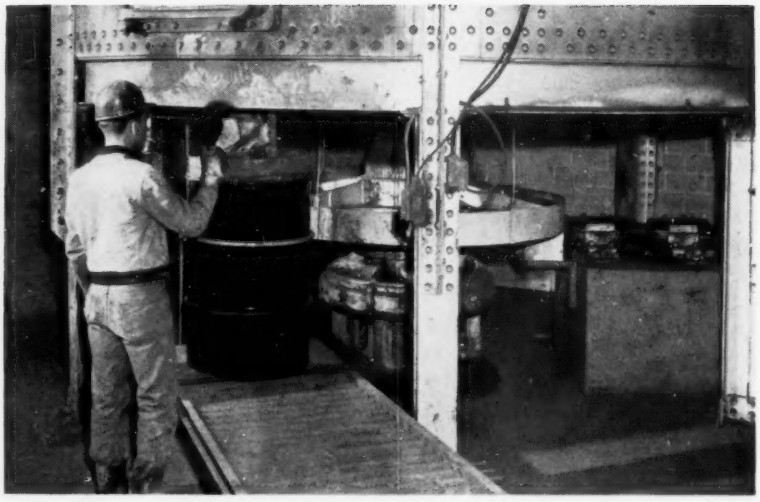

Calciner decomposes diuranate to black oxide concentrate.

Uranium-bearing solvent from the first extraction stage is pumped to a five-stage countercurrent stripping section where it's contacted with 10N hydrochloric acid. The acid provides hydrogen ions for regeneration of the solvent, chloride ions for the production of uranyl chloride. Uranium-free DDPA from the stripping cycle is returned as feed to the fourth stage of the extraction section. A sidestream of DDPA may also be stripped with hydrofluoric acid to remove accumulations of titanium and other solvent poisons that aren't removed by HCl.

Final concentration of the uranium and recovery of the hydrochloric acid for recycle is accomplished by two-stage evaporation and condensation. The first stage passes strong HCl vapors directly to the condenser; bottoms are passed to the second stage. HCl vapors from stage two are scrubbed with sulfuric acid for water removal, then fed to the condenser.

The uranium-rich heel from the second stage of evaporation is cooled, diluted and precipitated by treatment with ammonia. The precipitated ammonium diuranate slurry is then dewatered by filtration and discharged to a multiple-hearth Skinner roaster for calcination. Roasting converts the ammonium diuranate into black oxide (U_3O_8), reduces chloride contamination to a tolerable level.

Liquid Ion-Exchange: Throughout the solvent extraction process, uranium from the aqueous phase is held by the DDPA without being actually dissolved in it. This feature of the system, says Hall, leads some metallurgists to the conclusion that the operation is more of an ion-exchange process than a true solvent extraction. But regardless of this fine distinction, the all-liquid nature of the process is the key to its consistently efficient operation within narrow control limits.

All of the solution streams in Vitro's new extraction plant are controlled by instrumentation. Flow of solvent to the extraction system, for example, may be controlled manually from the instrument panel, or automatically regulated to a predetermined setting. Hydrochloric acid feed to the stripping section is measured by a ratio controller, maintained at a constant fraction of the organic flow into the system. Aqueous feed to the plant is similarly controlled to provide the desired liquor-to-solvent ratio.

Proved Performance: Vitro's experience in both pilot- and commercial-scale operations has shown that mills using solvent extraction can process liquors of higher-than-expected uranium content with relatively few operational changes. In addition, performance problems peculiar to specific feedstocks can be overcome by slight modification of the solvent, or of the processing conditions.

These advantages—together with its inherent adaptability to automatic control—give fair assurance that solvent extraction will continue to give other recovery methods stiff competition.

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1, 3-Dibromo-5, 5-dimethylhydantoin. $C_5H_6Br_2O_2N_2$. A bromine carrier and oxidizing agent. Useful in synthesis for side chain bromination and bromination of allylic carbon atoms. A fine stable powder with a minimum active bromine content of 54%.

β - Diethylaminoethyl Chloride Hydrochloride. $(CH_3CH_2)_2NCH_2CH_2Cl \cdot HCl$ (DEC). A granular solid. Specially suited for use as an intermediate in organic chemical manufacture, including antispasmodic agents and other pharmaceuticals.

β - Dimethylaminoethyl Chloride Hydrochloride. (DMC). $(CH_3)_2NCH_2CH_2Cl \cdot HCl$. A granular solid. Specially prepared for use in manufacture of antihistaminics and other pharmaceuticals. Other potential uses in organic synthesis. Relatively nontoxic in hydrochloride form.

β - Dimethylaminoisopropyl Chloride Hydrochloride. $(CH_3)_2NCH_2CHClCH_3 \cdot HCl$. (DMIC). An organic intermediate similar in appearance and properties to DEC and DMC. Specially prepared for manufacture of analgesics and other pharmaceuticals. Other potential uses in organic synthesis.

γ - Diethylaminopropyl Chloride Hydrochloride. $(C_2H_5)_2NCH_2CH_2Cl \cdot HCl$ (DEPC). A light tan to white crystalline hygroscopic solid. Used in pharmaceutical manufacture, especially for introduction of the diethylaminopropyl radical.

γ - Dimethylaminopropyl Chloride Hydrochloride. $(CH_3)_2NCH_2CH_2CH_2Cl \cdot HCl$ (DMPC). A white powder of singular purity. A versatile intermediate for pharmaceutical and organic syntheses, available exclusively from Michigan Chemical.

Ethyl Bromide. A clear, colorless, volatile liquid, specially prepared for use as an intermediate in organic synthesis. Practically free from impurities; has a narrow boiling range. Used in manufacture of dyes, perfumes and pharmaceuticals.

Hydrobromic Acid. A clear, colorless or light amber colored fuming liquid. Used for manufacture of inorganic metal bromides, aliphatic bromides, pharmaceuticals, dyes and intermediates. 48% acid and other strengths.

Magnesium Carbonate, Basic, Technical. Fine, uniform white powder, 325 mesh, bulk density 5.5 pounds per cubic foot. Very reactive. Used for rubber compounding, printing inks, paints, varnishes. Anticaking agent for table salt; conditioning or bulking material for powder formulations.

Magnesium Hydroxide. Fine, white powder, typical assay 96.3%, low in moisture, iron, alumina, silica. Technical and NF X grades. Special bulk densities available in NF grade. Convenient material for manufacture of light magnesias, other magnesium compounds.

Magnesium Oxides. Six principal grades of Michigan magnesium oxide with wide range of desirable physical and chemical characteristics covering principal uses of MgO, including rubber compounding, rayon manufacture, ceramics, glass, refractories, insulation.

Methyl Bromide. A heavy, colorless liquid, vaporizing at 40 degrees F., nonflammable and poisonous. Highly penetrating and insecticidally effective fumigant. Also used in organic synthesis for the introduction of the methyl group, especially in preparation of certain pharmaceutical chemicals.

Monobromobenzene. Clear, colorless, heavy liquid. Specially prepared for use as an intermediate in preparation of organic compounds. For introduction of the phenyl radical and in Grignard-type reactions. A pure material with a 2 degrees C. boiling range; specific gravity 1.495.

Phosphorous Tribromide. Brominating agent. A liquid, boiling point 173 degrees C., which fumes in contact with moist air. Used in synthetic work to convert alcohols to bromides, and acids to acyl bromides. Specially useful in preparation of bromides from alcohols without rearrangement.

Potassium Bromate, Granular. A fine, white, granular or crystalline material 99.5% pure. Decomposes at 370 degrees C. with evolution of oxygen. Strong oxidizing agent, used as an analytical reagent. Neutralizer in permanent wave compounds.

Potassium Bromate, Powder. A fine uniform powder with same properties as Granular. Available with added magnesium carbonate conditioning agent when specified. Suitable for use as an aging additive for flour.

Potassium Bromide, N.F. X. Pure, white granular powder. Low in chloride, passes all N.F. requirements. Widely used in the preparation of photographic emulsions, and in lithograhy. One of the most important sedatives. Available in several granulations.

Sodium Bromide, U.S.P. XV. Pure, white crystaline powder or granules. Passes all requirements of the U.S. Pharmacopoeia. High assay; low in chloride. An important nerve sedative. Used in manufacture of other bromides. Contains about 77.5% bromine.

Tetrabromophthalic Anhydride. $C_8Br_4O_3$. High molecular weight phthalic anhydride having a bromine content of 66%. Will undergo most of the reactions of phthalic anhydride. Pale yellow crystalline compound melting point minimum 265°C.

Trimethylene Chlorobromide. Clear, colorless liquid used in manufacture of anesthetic grade cyclopropane. Greater reactivity of bromine atom makes trimethylene chlorobromide specially useful also in preparation of gamma chloro compounds. Boiling range 2 degrees C. maximum.

Zinc Bromide Solution, Optical Grade. Clear, colorless solution, about 80% $ZnBr_2$. Used in laboratories dealing with radioactive chemicals as a radiation viewing shield; the most satisfactory material. Meets all chemical and optical specifications of Argonne National Laboratory.

Also Manufacturer of Rare Earth Compounds and Metals, Pestmaster Insecticides, Pestmaster* Methyl Bromide Fumigants and Dustmaster* Road Chemicals.*

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*Reg. U.S. Pat. Off. C-56-10

BASIC MANUFACTURER OF INDUSTRIAL, PHARMACEUTICAL AND AGRICULTURAL CHEMICALS

HURON* VITAL WHEAT GLUTEN

What it is . . . Huron Vital Wheat Gluten is a protein concentrate obtained by processing wheat flour to greatly reduce its starch content. To maintain the native vitality or elasticity of the original wheat product, it is carefully dried at low temperatures and ground to fine particle size. Huron Vital Wheat Gluten will therefore retain its ability to absorb water, and yield an elastic mass when incorporated into breads, cereals, or other processed foods. Huron Vital Wheat Gluten is sold as a light tan powder, having 75% protein on a dry basis (approximately 71% on a 6% moisture basis).

CEREALS

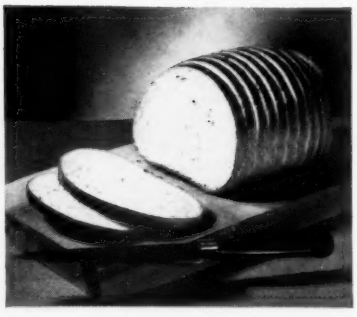
Huron Vital Wheat Gluten is used in both cooked and dried cereals, providing important functional properties and outstanding nutritional values to a variety of cereal products.

FOOD CHEMISTRY

Because of its combination of natural elasticity and high nutritional content, Huron Vital Wheat Gluten offers food chemists a unique tool for the formulation of improved food products. Its high bonding characteristics provide cohesive structures during processing; after cooking, it affords rigid expanded structures of attractive texture, crumb, and palatability.

BAKED PRODUCTS

Vicrum is Hercules' trademark for Vital Wheat Gluten manufactured for use in the baking industry. It is specially processed and selected to meet rigid specifications and provide high, uniform baking performance. Vicrum can be used to complement the normal behavior of flours.† It is particularly useful in improving the quality of specialty breads as measured by texture, crumb, volume, and keeping qualities. Because its addition increases the fermentation tolerance and strength of doughs, it offers greater flexibility during processing. Vicrum is in growing commercial use as a baking adjunct used at 2-4% levels, particularly in specialty breads such as rye.



*Hercules Trademark.

†*Before adding Vicrum to food products, bakers should check Federal & State Standards of Identity.*

For full descriptive literature on Vital Wheat Gluten, call or write

HURON MILLING DIVISION

Virginia Cellulose Department

HERCULES POWDER COMPANY

INCORPORATED

Wilmington 99, Delaware

VVSB-1

Sales Offices: 380 Madison Ave., New York 17, N.Y. • 332 South Michigan Ave., Chicago 4, Ill. • 120 Montgomery St., San Francisco 4, Calif.

Market Newsletter

CHEMICAL WEEK
March 1, 1958

The recent sharp cut (4¢/lb.) in metallic antimony prices is sparking considerable speculation in the trade that antimony oxide tags will also take a dive. A spot *CW* check among oxide sellers, however, indicates that users of domestic oxide aren't likely to derive any benefit from the metal's price drop.

Says one maker: We reduced our antimony oxide prices last December, and our latest price list (dated Feb. 6) reflects the changes. The cuts bring c.l. quantities down to 24½¢/lb. from a previous 27¢, and l.c.l. down to 26¢/lb.

Thus, further depressing of the price—at this time, at least—seems to be ruled out, regardless of the reported influence of foreign oxide.

•

There's a similar situation boiling in the benzene market. Despite comment published elsewhere of "unconfirmed reports" that the long-time-held 36¢/gal. (tank) price on the aromatic is being "shaded," major sellers of coal tar- and petroleum-derived material insist that posted schedules are "firm," that no domestically produced benzene is moving at less than official quotes.

Source of the price-cutting talk may well be this: benzene sellers are—and have been for some time—stretching for customers beyond their usual areas of operations, and offering to equalize freight to meet competition at these more distant points. Net return to the seller then is actually lower, because of the higher freight costs, but the posted 36¢ tag ostensibly remains inviolate.

Shaping up, however, is a factor destined to cause some acute market headaches—the increasing amount (50-60 million gal./year) of petrobenzene capacity now coming in and due to come in. Oversupply will probably be "tremendous," says one marketer, if all the new units begin operating. Lower prices won't step up benzene sales (*CW Market Newsletter, Feb. 1*); it isn't worthwhile to downgrade the material to 9-14¢/gal. for motor fuel use since just about all the needed supply of high octane is coming from regular gasoline operations.

The rough decision newer benzene producers must soon make: operate their spanking-new installations at a loss or postpone production until the market climate improves. It's a situation worth watching, and one, apparently, for which there is no easy solution.

•

Aniline oil prices were chopped 10% early last week, and related reductions were also posted on dimethylaniline and nitrobenzene. American Cyanamid initiated the moves (now industry-wide), which were inspired by its turning startup valves at a new 24-million-lbs./year plant at Willow Island, W. Va. (*CW, June 23, '56, p. 68*).

"Passing along greater manufacturing economies" is the way Cyanamid describes the reductions—and other producers, of course, have gone along for competitive reasons.

Actually, demand for aniline has been slack because of slowness in textiles and rubber (two major outlets), but even though total U.S. potential will soon exceed 160-million-lbs./year, major marketers aren't too concerned; capacity-pacing demand is an aniline industry characteristic, generally considered "good insurance" for consumers, and a chief reason for the material's remarkably steady price pattern over the years.

The 20¢/lb. tank-car price, which has just been dropped to 18¢, for example, had been in effect for almost 5 years. New dimethylaniline tank tag is 28¢/lb. (down 2¢); nitrobenzene is reduced to 11¢/lb. from a previous 12¢.

•

Pricing picture on high-density polyethylene was somewhat blurred last week, but it's coming into focus now. Kickoff to lower prices was Phillips Chemical's notification to customers that it was offering a basic 2¢/lb. drop plus "quantity discounts"; the latter ranged from ½¢-2¢/lb., depending on quantity (100,000 through 400,000 lbs. or more) taken "within a 6-month discount period."

Hercules Powder then went a step further, applied a 4¢/lb. "straight-across-the-board" reduction on its general-purpose types of high-density polyethylene, established a "new base price" of 43¢/lb., compared with the previous 47¢.

The new Phillips schedule was described in the trade as "too complicated," and, by early this week, other low-pressure-poly producers —including Grace, Celanese and Koppers—had posted, or were posting, a Hercules-like base price.

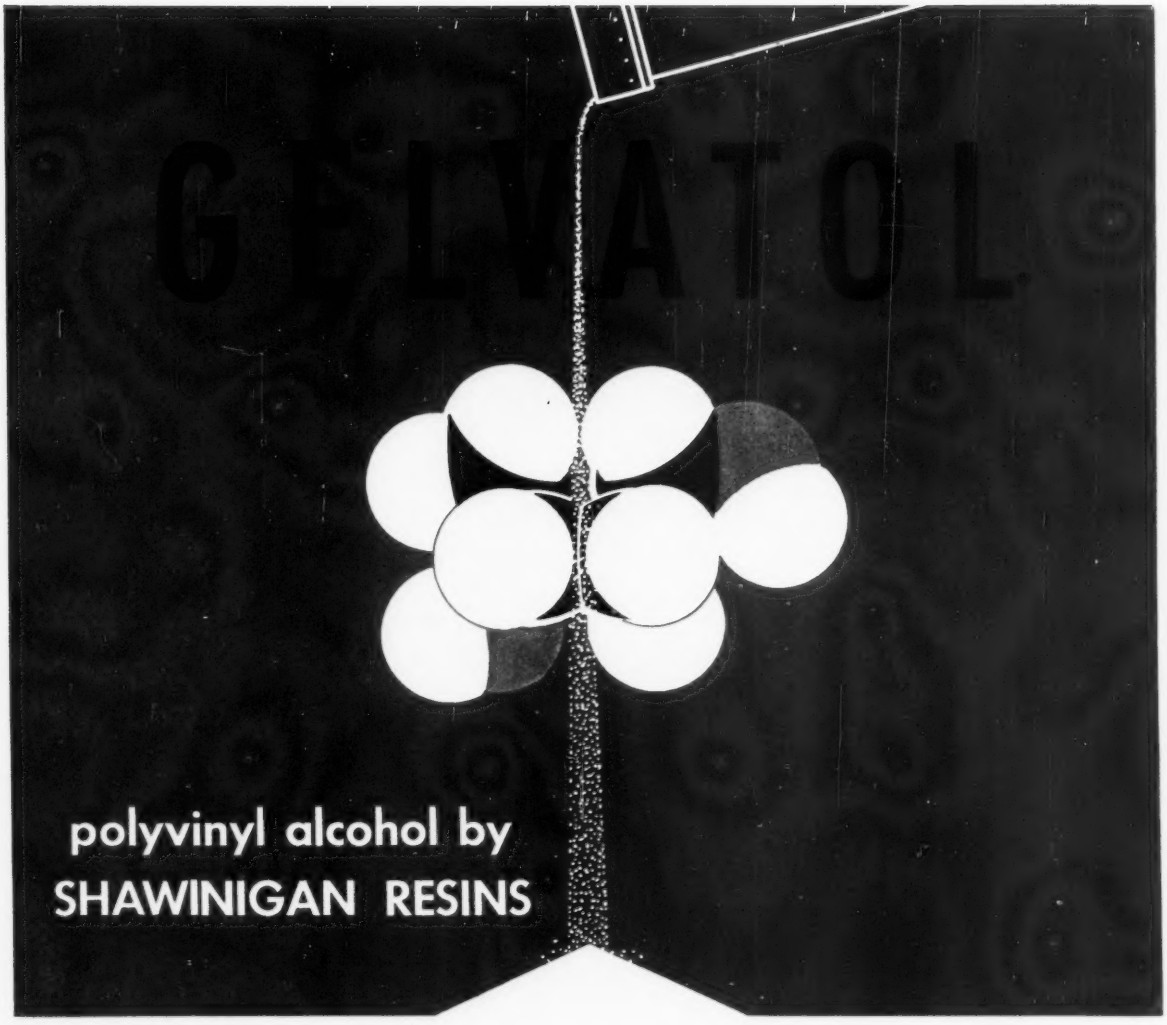
Phillips, too, *CW* learns, is now withdrawing its earlier quantity-discount list, will make the 43¢/lb. base industry-wide.

Trade-anticipated result of the lower high-density tag: it should broaden the range of application, push high-density closer to mass consumption.

SELECTED PRICE CHANGES—Week Ending February 24, 1958

	Change	New Price
Up		
Mercury metal, 76-lbs./flask, unit-flask	$5.00	$226.00
Tin metal (Straits)	0.01875	0.94875
Down		
N-N-Dimethylaniline, dms., c.l., frt. alld.	0.02	0.30
Polyethylene, high-density, general-purpose, c.l.	0.04	0.43
Nitrobenzene, dbl. dist., c.l., frt. alld.	0.01	0.13

All prices per pound unless quantity is stated.



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1. Particle size that minimizes dusting.
2. GELVATOL requires 25-50% less storage space.
3. Notable uniformity from bag to bag, lot to lot.
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GELVATOL®— *polyvinyl alcohol by*

SHAWINIGAN RESINS®

Signal from control panel starts machinery that automatically fills orders for drugs and cosmetics.

Press the Button—In 15 Seconds, the

Within 15 seconds after the button (above) is pushed, a wholesale drug and cosmetics order is selected and delivered to a packing station. The machine that's controlled by this panel represents a new approach to automatic order-filling; and this week, details on just how it operates have been made available.

Now in operation at Brunswig Drug's Los Angeles Division, the new equipment can stock up to 99 units each of 160 separate commodities, can spew out 2,000 complete orders in an 8-hour day. And, unlike several other automatic order-filling systems, the new unit can handle a great variety of different commodities without the need of order-pickers or manual machine programing.

But high speed isn't the only advantage the machine's designer, Industrial Electronic Engineers (North Hollywood, Calif.), is claiming. Reduced manpower requirements and order-filling errors are also part of IEE's sales pitch.

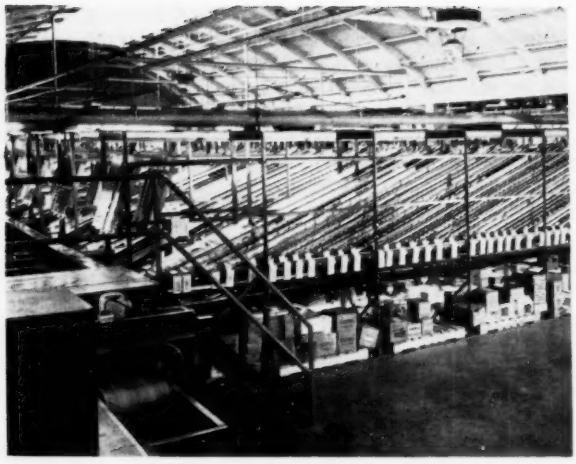
Here's how it works:

Storage: Five "main" or collector conveyors run through the center of the machine. They deliver merchandise to packing stations at one end of each main conveyor.

Merchandise is stacked in chutes leading to feeder belts. The chutes are angled 20 degrees to the horizontal. Brunswig's equipment handles packages up to 6x8x9 in. in size. (Chute width adjustment is simple; depth adjustment is somewhat difficult.)

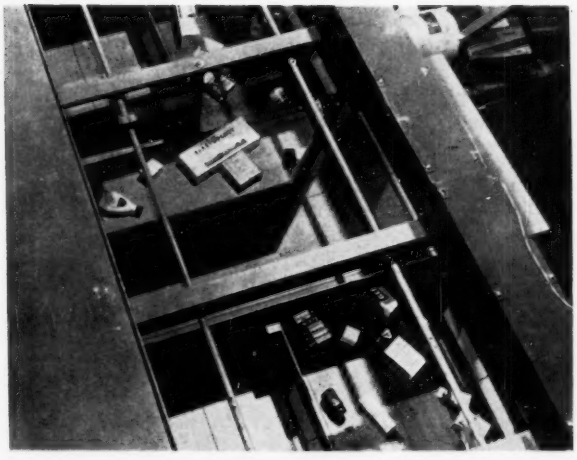
The chutes are grouped together to form 18 storage "bays"—nine on each side of the collector conveyor system. The bays are 40 ft. long, 3 ft. wide, 9 ft. high. A 5-ft.-wide aisle separates adjacent bays to facilitate restocking. Each bay stocks about 100 different items—generally at least an 8-hour supply of each.

Dispenser mechanisms on each chute release merchandise, and a spe-



Signal activates storage chute mechanism.

Chute drops merchandise onto feeder belt.



Diverter shunts items to central belt.

Merchandise arrives at packing station.

Order Is Ready for Packaging

cial sensor switch verifies the "release" to a computer. Released items drop onto the feeder belt moving toward and crossing over the center collector conveyor. Computer-operated diverter gates shunt arriving merchandise onto the proper collector conveyor, which carries packages to the packing station.

Capacity: Ten orders can be processed at one time. The computer automatically closes a gate behind an order when it is delivered and can then hold another order in the channel "in reserve." This order can be released by a push-button signal from the packer when he is ready.

Control equipment consists of a magnetic drum, digital computer, a relay switching system and an IBM machine for input information. The control gear on Brunswig's installation is oversize to allow for expansion. With additional bays, 10,000 different commodities could be stocked; and if required, 1,032 commodities could be processed on a single order.

The machine is programed to stop automatically when an out-of-stock condition arises. The operator can note this and then restart the machine.

Order Filling: For each order, a punch card is prepared, which shows items and quantities of each needed. Batches of 20-30 orders, with appropriate billing documents are sent by conveyor to the machine control panel.

The operator then places the cards in the IBM machine and presses the button. While the machine selects a collector conveyor belt and processes the order, the operator checks the billing documents against the customer account number and conveyor number that are flashed on the panel. Next move: the operator drops order papers into a chute, which carries them to the packing station.

Upon completing one order, the machine automatically begins to proc-

ess another in the same fashion.

Errors that crop up in the order-filling sequence are usually human ones. They generally stem from mistakes in chute loading or the accidental dropping of an item on a belt. The machine, says IEE, can't detect human errors but readily catches its own mistakes. Over-all, the machine's error rate is 1%—substantially below the error rate of manual order-filling.

Brunswig has encountered minor difficulty with liquid leakage. Repeated jarring of bottles in chutes sometimes loosens closures.

The machine will handle 40% of Brunswig's open-stock requests. The remaining orders—all for slow-moving items—are processed manually. Case quantities, too, are handled manually.

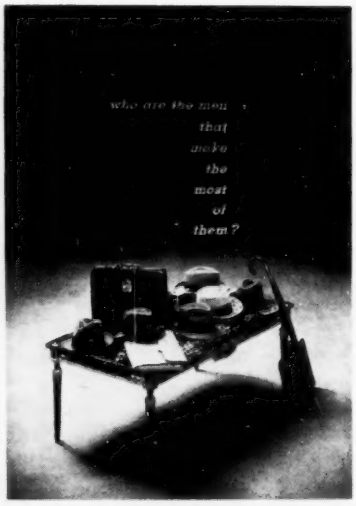
Economics: Brunswig's installation can be reproduced for about $200,000. Other installations cost $40,000-$250,000. Maintenance isn't much of an operating cost factor. Downtime approximates 1%. Services of a skilled technician are needed, however, when such stoppages occur. Cost factors are more than balanced out by reductions of labor force—estimated by Brunswig at 33%.

Other Entries: IEE's machine isn't the only aproach to automatic warehousing. Other recent systems include:

• Walter Kidde-Link Belt prototype system, using trolley conveyors and electronically controlled routing to packing station. This method requires order-pickers and a routing operator (*CW, April 9, '55, p. 62*).

• Lambert-Hudnut's automatic order filler at Lititz, Pa. This device is similar in principle to IEE's but handles only 20 different items in cartons. The complete order is manually programed into the computer (*Factory, May '57, p. A-16*). A similar design at Gallo Sales Co. in San Francisco handles 58 different types of wine in cartons (*Food Engineering, Aug. '57, p. 66*).

• A machine at Hickok's brace, belt and garter plant at Lyons, N.Y., which fills orders for braces only, can



Cryptic Teasers Launch Sales Drive

Advertising men in the chemical industry are watching how Dow Chemical fares with its teaser series for polyglycols—an unusual promotion plan for industrial chemicals. Dow, borrowing a leaf from the *Saturday Evening Post*'s own "Influential" ad campaign, recently ran a series of provocative—but unidentified—ads in business magazines and, from foreign cities, also mailed postcard-size reproductions of the ads to the CPI. Its theme, "who . . . makes the most of them?" was built around the large number of products in its line. In a later ad and direct mail, Dow identified itself. It will follow up its "teasers" with a special sales drive.

How Research Shapes Our Future Prosperity

If you are looking for an industry that is going to keep on booming in 1958 and every year for the next decade, here it is. It is the industry of technological innovation through research and development.

Last year this great new industry spent over $7 billion to discover and develop new industrial products, processes and equipment. This year the preliminary McGraw-Hill survey indicates that total expenditures for industrial research and development will be even greater, perhaps as much as $8 billion. Of the companies surveyed, 57% plan to spend as much as in 1957 and 38% plan to spend more.

The sustained expansion in research and development is the best guarantee we have that the current decline in business investment in new plants and equipment will be relatively short-lived. There can be no prolonged decline in investment in an economy where technology is changing rapidly.

This editorial is designed to show how the continued surge in research and development can be expected to lead first to new products, and eventually to renewed expansion of investment in new industrial plants and equipment. Such expansion is the essence of national economic growth.

A Slow Start

The impact of research on sales and investment is still very gradual. Research spending itself has more than doubled in the last four years. But only 32% of all manufacturing firms report significant capital outlays to make new products. We are not reaping the full dividends of industrial research as yet for several reasons:

- Research expenditures were relatively small until the Korean War of 1950 brought substantial government contracts in aviation, electronic and related fields. Heavy research outlays for civilian and industrial products came even later.

- There is an average *lag*, according to research directors consulted by the McGraw-Hill Department of Economics, of roughly seven years from the start of research until the product is ready for large scale output — about five years of research and at least two years to solve production problems and develop markets.

- Complex products, such as new consumer durables and industrial machinery, have an even longer time lag.

However, new developments are certainly underway. Research began to increase in all lines of business when Korean War restrictions and

the excess profits tax came to an end in 1953. The tax revision of 1954 added a new incentive by making research outlays deductible as a current business expense. By 1955, the research boom was on.

When Is The Payoff?

With a lag of about seven years, it will be the early 1960s before these new developments become a dominant factor in capital investment. But once the flow of new products and new processes starts, it will accelerate sharply — just as research spending has accelerated in the past few years.

By 1960, over $50 billion in sales will be coming from products not on the market as recently as 1956. Sales of new products will increase year by year, but they will gain most in 1960-1962, or five years after the recent spurt in research expenditures.

Capital expenditures to manufacture new products will also rise, but with a slightly longer lag. Here the sharpest rise should come in 1962-1965, as the new products reach a volume that calls for a significant amount of new capacity. In most cases, initial output of new products will come from existing capacity.

This timing of a new wave in capital investment appears logical on other grounds. Population experts forecast an upsurge in marriages and births around 1965. So by 1962, industry will be starting to tool up for new mass markets.

The important point is this: As we approach the 1960s more and more sales and investment will be in new products growing out of research. By 1960 well over 10% of manufacturing sales will be in new products not on the market in 1956.

Meanwhile — research will help stabilize capital spending by raising the level of modernization and replacement expenditures. Of course, research does not eliminate all the ups and downs in the demand for capital goods, for there remain variations in the amount spent to expand capacity. But a high level of modernization, to cut costs and improve quality, does put a floor under any drop in investment.

What To Expect

During the next few years we can expect an increasing flow of new materials, new metallic alloys, new machinery — primarily those developments coming out of long-established research programs in the chemical and electrical industries. Industry will make wider use of specialized computers and automated equipment.

But the dramatic payoff on research comes even later. In the early 1960s the consumer goods industries will begin tooling up for their really new products — things so basically new they can change the way a family lives. Such items as plastic houses, paper apparel, turbine autos are under development right now. But it will take several years to get costs down and for population and incomes to grow to the point where mass markets are created.

When we reach that point in the mid-1960s, there will begin the greatest surge of capital investment in all history. And then — around 1965 — the new processes (full automation, atomic power, continuous steel casting) which are the slowest and most expensive part of the research chain to develop, will come into play.

The combined impact of new products and new processes, to meet an expanding market, will thus be felt in the mid-1960s — eight to ten years after the recent sharp increase in research spending. The full impact is that far away because of the lags for applied research, pilot plant studies and market introduction. But to a large degree the prosperity of the 1960s has already been shaped by the research programs now underway.

handle only one box size. Changeover to another box size is difficult.

• Automatic order-filler for ladies' wear. This system, designed by Dasol Corp. (New York), involves bulk storage of garments by style and color. Bulk boxes of desired type are hand-picked, belt-conveyed to points where ordered quantities are hand-picked, then belt-conveyed to a packing station. Another Dasol installation *(Business Week, July 6, '57 p. 64)* uses pickers to fill orders from a belt bringing incoming merchandise directly from the receiving platform.

Cautious Welcome: Undoubtedly, automatic order-filling is on the way. But it's debatable just how fast industry will take to the idea. The Kidde-Link Belt apparatus has yet to find a customer, although it has been available for over two years. And Hickok's version has been dismantled to provide room for expanded manufacturing operations at its Lyons plant. Yet, automatic order-filling offers some real advantages in reduced labor needs and faster operation. That's why management men in all phases of the chemical and process industries are maintaining an active interest in approaches to the problem.

DATA DIGEST

• **X-ray diffraction:** Using question-and-answer format, 16-page booklet covers points most frequently raised by students at X-ray diffraction school. Instruments Division, Phillips Electronics, Inc. (Mount Vernon, N.Y.).

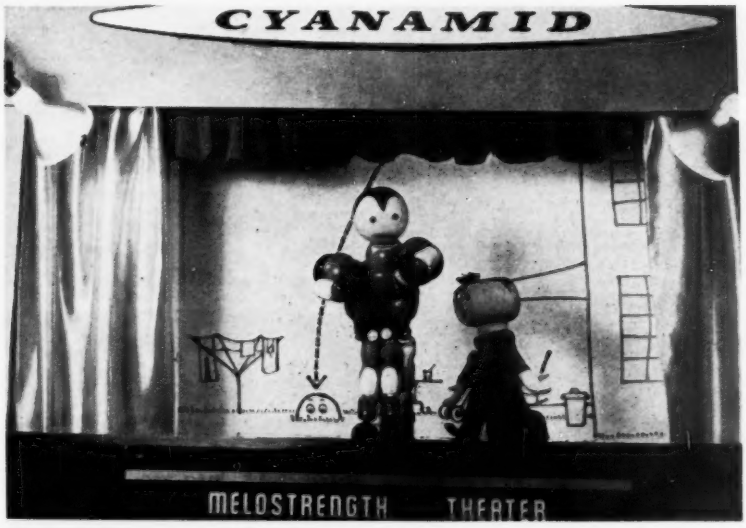
• **Label adhesives:** Manual describes methods of testing and analyzing labeling adhesives. Price: $5. Packaging Institute (New York).

• **Chemical milling:** 10-page brochure defines chemical milling, gives characteristics, applications, processing techniques and design recommendations. U.S. Chemical Milling Corp. (Manhattan Beach, Calif.).

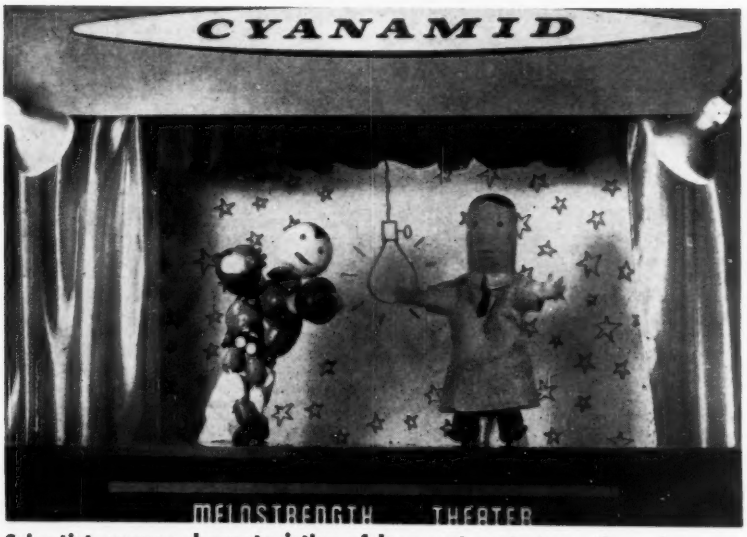
• **Russian-English glossary:** Book lists 22,000 Russian terms in physics and electronics. Price: $10. Consultants Bureau, Inc. (New York).

• **Materials handling:** Handbook presents thorough discussion of equipment, principles, problem analysis, system design and other aspects of materials handling. Price: $20. American Society of Mechanical Engineers (New York).

Old-style side-show barker makes the come-on pitch.



'Molecular' puppet tells youngster what paper resins can do.



Scientist recaps characteristics of low-cost wet-strength resins.

SALES

Puppets Plug Resin Sales

Puppets joined American Cyanamid's sales team last week in a novel bid to dramatize a new process for using melamine wet-strength resins in paper treatment—Cyanamid's new "HE" (high efficiency) process.

Cyanamid used the puppet show mainly as an attention-getter. It figured that if a potential buyer noted how the process allowed 30-60% reductions in amount of melamine wet-strength resins needed, yet gave equal paper strength characteristics (*CW Technology Newsletter, Feb. 22*), a big part of the sales job was done.

Four times daily at the week-long annual conventions of paper trade associations* in New York City's Commodore Hotel, the puppets made a pitch to the 5,000 industry executives who trooped through the lobby.

In the skit, a scientist turns a career-conscious youngster over to a puppet modeled after and representing the molecular structure of Cyanamid's well-advertised Melostrength resin. "Mel" portrays a glowing future (and career opportunity) in paper products —disposable clothing, paper pots and pans, automobiles, etc. And "Mel" sets the stage for the last character, "Hy"—a puppet representing the new process. Two scenes stress the resin's ability to cling to paper.

Process Aspects: Publicly, Cyanamid is saying little about its process other than that it cuts 40% off the amount of resin required and 10-20% off the total paper-treatment costs. The resin is the same in both the regular and the "HE" process. But in the latter, the resin is especially "fortified" just before use. Cyanamid will market the process by means of licensing agreements.

New Vistas: Cyanamid envisions new market opportunities for its resins because of the cost reduction. Kraft paper-treatment—especially in grocery bags and paper sacks—appears as the most immediate target. But generally, the firm expects all paper markets for its resin to expand. If that happens, the puppet pitch will have paid off.

*American Paper and Pulp Assn. (APPA); Technical Assn. of the Pulp and Paper Industry (TAPPI).

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Opening for research and development chemist experienced in the manufacture and various uses of protective coatings, wax, wax compunds, resins, polymer dispersions, plastic, and bituminous materials in industrial manufacturing company laboratory located in Middle West. Apply by letter giving full details of education and experience. All replies will be confidential. P-5213, Chemical Week.

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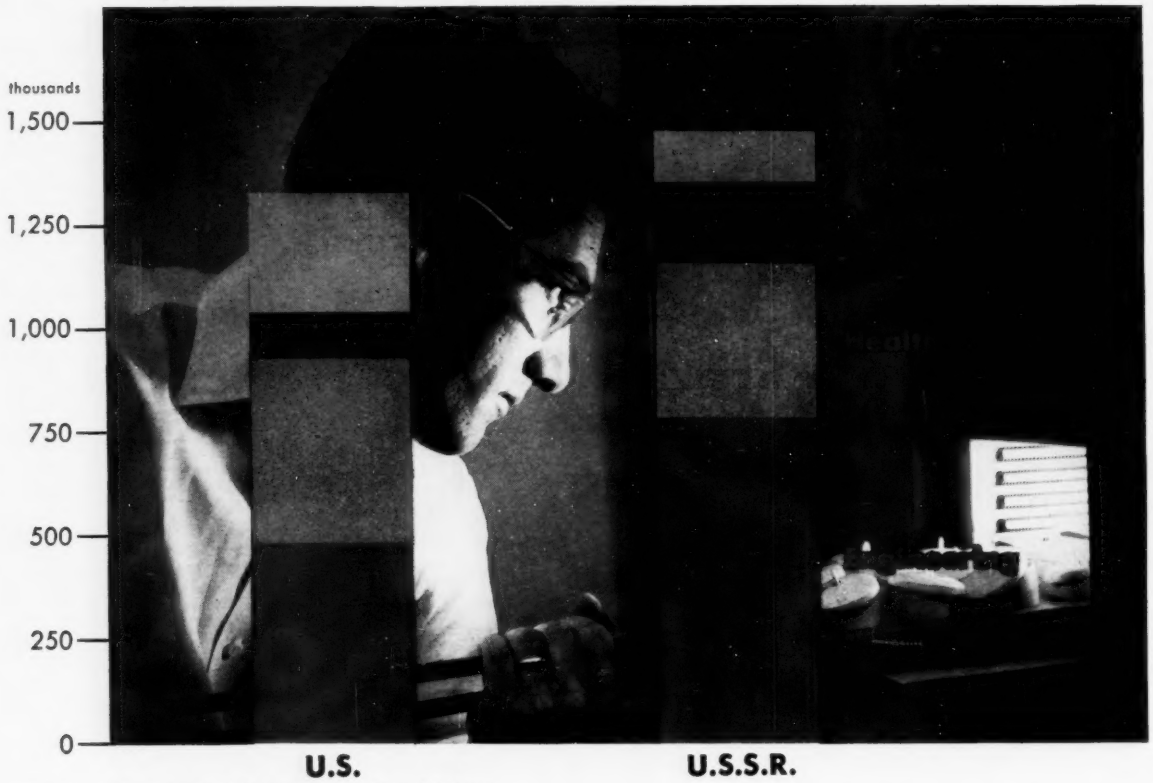


*Mid-'57. Source: President's Committee on Scientists and Engineers.

Shifting Scientific Manpower Balance

Latest figures reported by the President's Committee on Scientists and Engineers reveals the U.S.S.R.'s increasing scientific manpower.

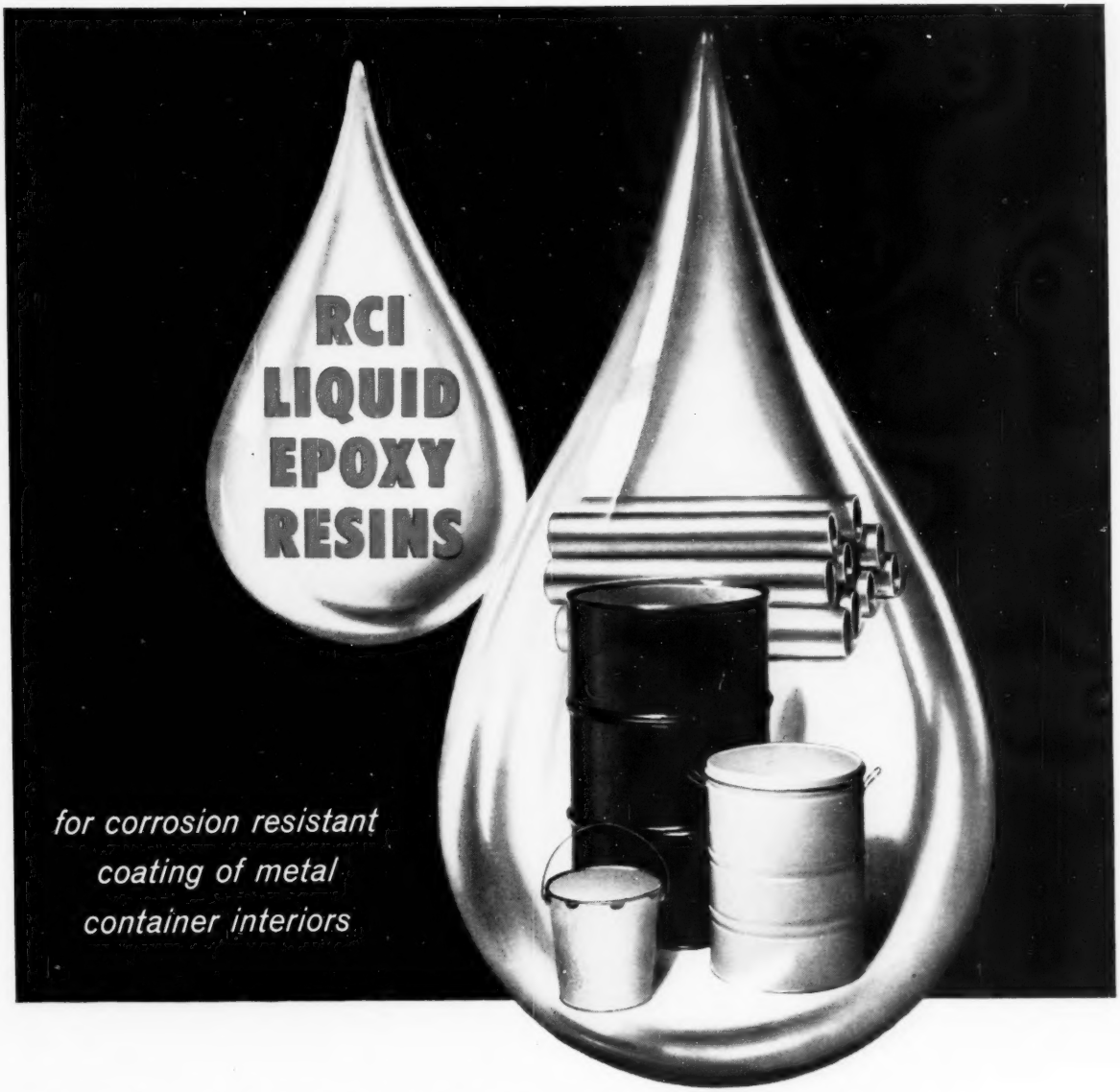
Last year, the Soviet Union had a slight edge over the U.S. in number of employed college-level scientists: about 1.5 million graduate scientists were employed in Russia, compared with 1.3 million in the U.S.

The U.S. led in scientists employed in the fields of health, physical and biological sciences, while the U.S.S.R. had a larger number of technical graduates in the engineering and agricultural industries.

The Soviet Union will probably have an advantage —in quantity, at least—over the U.S. in the future:

- Population of the U.S.S.R. is 20% higher.
- Within the next decade, the U.S.S.R. expects a greater increase in the number of men in the 25-44 age bracket, the group from which future technologists will come.
- Current flow of new science and engineering graduates is significantly higher in the Soviet Union than in the U.S.—some 134,000 vs. 92,000 in '57.

The report points out, however, that, while the Soviet Union is outstripping the U.S. in production of scientists, the U.S. is educating, at the college level, a far greater number of students and a greater proportion of the country's population.



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